SURGERY AND CLINICAL PATHOLOGY IN THE TROPICS

SURGERY AND CLINICAL PATHOLOGY IN THE TROPICS

BY

CHARLES BOWESMAN

OBE, BA, MD, FRCSE, FACS, DTM & H Ed

Fellow of the Royal Society of Medicine
Fellow of the Royal Society of Tropical Medicine and Hygiene, late House Surgeon, Cumberland Hospital, Carlisle, Royal Devon and Exeter Hospital, late House Physician, Royal Sussex County Hospital, Formerly Medical Officer, Gambia, West Africa, Surgical Specialist, Gold Coast and Ghana Governments



E & S. LIVINGSTONE LTD
EDINBURGH AND LONDON
1960



Made and Printed in Great Britain

Preface

In my student days it was a source of wonder to observe the astuteness of my teachers who on slender grounds, it then appeared, based their conclusions Clinical observation was obviously of enormous importance but how could one remember all?

It was on the advice of the late Dr Henry C Drury, Senior Physician of Sir Patrick Dun's Hospital, Dublin, that some of us started keeping, as he called it, "A Medical Scrap Book"—notes of unusual cases, sometimes a photograph of a clinical oddity or a diagram of some piece of apparatus aptly suited for a particular purpose Such a book was started with modest proportions Later its bulk increased with records of operations, the pride of most beginners To this was added a section for the noting of errors in the hope that caution might be improved and vanity set aside After twenty-five years many books were filled, and it seemed a pity to throw it all away It was apparent that these records might with advantage be used to compile a useful book on "Surgery and Clinical Pathology in the Tropics," for much of the material was collected during this time in various parts of West Africa Having experienced the vexations of those working in isolated places as well as the pressure of work in the larger centres, this book is written not as a textbook for examinations but rather as a series of essays on situations and subjects as they occur in clinical practice This method predisposes to some extent to a slight degree of repetition, but it has the advantage that it makes for easy and leisurely reading, and it is hoped that those who peruse its pages will find it so If it gives the answer to even some of the difficult problems which constantly arise in country stations it will have achieved its main object, so being a help to the doctor and, more important, the patient committed to his charge

CHARLES BOWESMAN

1960

Acknowledgments

To many of my professional colleagues I am indebted for suggestions they have made regarding the production of this book The wide range of requests for the inclusion of particular subjects received from doctors working in remote and often very isolated places has as a result made the work longer than was originally anticipated It is hoped that the information given answers their problems as adequately as space permits

This work has been encouraged by my former Chief and Surgical Consultant at Cumberland Infirmary, Carlisle, Mr J N J Hartley, O B E , F R C S His guidance to me as a junior, and his interest in my work throughout the past twenty-five years, has been an influence which has led me to appreciate the value of such a friendship more than is easy to express

Professor D E C Mekie, O B E , F R C S Ed , Curator of the College of Surgeons, Edinburgh, and late Professor of Surgery at the University of Malaya, Singapore, has indicated where changes and modifications could be made in the typescript with advantage Mr H K Vernon, M S , F R C S , Surgeon to St Peter's and Balham Hospitals, gave careful attention to the section on genito-urinary diseases My twin brother, R Bowesman, M D , D T M & H , supervised several of the chapters and pointed out some details requiring clarification Dr B B Waddy, M D , D P H , D T M & H , lecturer on Tropical Diseases at the School of Tropical Medicine, London, criticised the medical aspects of many tropical conditions, and this necessitated some modification of nomenclature to bring it into line with modern trends This was most helpful

Acknowledgment is also made to the Honourable The Director of Medical Services, Gambia, Dr S H O Jones, C B E , and his staff for tracing many official records for me To recall cases seen in that country brings back happy memories of my service in Gambia The Ministry of Health of Ghana has put at my disposal records and X-ray films which have been used in the illustrations On going through my letter files I note many communications received from well-wishers who have put photographs at my disposal

The staff of the Royal Zoological Society, London, have given me facilities not accorded to the general public With the help of Mr R A Lanworn, the Chief Supervisor, and Mr T Dexter, the Head Keeper at the Reptile section, it has been possible to take photographs of some of the snakes which are not found in the area of the world where my duties took me

ACKNOWLEDGMENTS

The facilities of the Library of the Royal Society of Medicine, 1 Wimpole Street, London, made the necessary researches possible as medical works in many languages are available The help of the Librarian, Mr P Wade, and his staff, who were always most obliging, was a great advantage

Having produced the work myself in draft form, it was re-typed by Mrs J Lynas, who undertook the work in a most conscientious and capable manner, making tactful corrections and modifications as only a good secretary can

My publishers, Messrs E & S Livingstone Ltd, of 15-17 Teviot Place, Edinburgh, have been most helpful, prompt, and co-operative with this work This necessitated careful preliminary planning so that time was not lost during its production

THE AUTHOR

1960

Contents

I

Introduction

IT seems fair to say that without doubt there is a great need for a book on surgical work in the tropics The constant request of house surgeons is to be given the name of a good book on this subject They feel that the type of work they are expected to undertake is so much at variance with the standard books of surgery, from which they have studied in their student days in temperate climates, that a book written exclusively for use of those working in tropical climates would be of considerable benefit It is quite remarkable to note the absence of surgical textbooks suitable for those working in the tropics when there are so many excellent textbooks available on tropical medicine The recent handbook on surgery written by Kerr[1] in Tanganyika for surgical assistants and other medical auxiliaries is excellent, but its scope is limited It is written primarily for workers locally trained who are expected to deal with minor surgical conditions only The surgical textbook by Chatterji,[2] written in India and published in 1927, served a useful purpose With advances in treatment and the introduction of the sulphonamides and antibiotic group of drugs that publication is now considered obsolete Although it is not being reprinted, it can still, however, be read with advantage Clinical conditions are described in an accurate and instructive manner The approach to treatment has, however, changed Many very helpful textbooks on tropical medicine continue to appear annually, but no textbook on surgery in the tropics appears to have been published dealing with major surgical problems from the English teaching centres, nor has one come from America as far as can be found Under the present circumstances this work is being undertaken with a view to supplying this need to some extent

Some criticism may well be expected, but this may not necessarily be a bad thing, it may even be a good thing in as far as it provokes a flow of articles to surgical and medical journals by way of contradiction to some of the views expressed Many of the opinions expressed are those which have been arrived at after some years of trial and error in the treatment of various conditions The related histories of conditions observed have been considered over many years It is difficult for those who have not been to the tropics to appreciate the conditions under which one works Many forms of treatment which are standard in temperate climates are quite impractical under tropical conditions, and many methods adopted in less advanced areas of the world, and which work well, would be strongly disapproved of in the higher academic centres of the northern hemisphere It was my pleasure in 1957 to meet Dr Azar, of the Department of Tropical Diseases at the American University of Beirut, Lebanon, and hear his opinion of Africa and work as it appears in the field He expressed the opinion to me that his tour of Africa had been most instructive but that he had felt it

necessary to modify some of his ideas on seeing conditions as they existed in Africa He expressed himself in the following way "Anyone like me who has studied his general medicine in a subtropical country and who went through a short but well organised course in tropical medicine and hygiene, and had in addition become engaged for some time in the teaching and practice of these related conditions, may fall into the error of considering tropical medicine as a clearly defined and well-outlined specialty in whose various branches competency can be easily achieved The same person will, however, eventually find out, after visiting tropical Africa and seeing the work, whether in the hospital or in the field, that to really learn and know about tropical medicine and to appreciate the magnitude of the various problems involved one must live and work in these places" The same no doubt can be said of other tropical land masses, such as South America and Asia You must go there to appreciate the problems involved There are few doctors who have the opportunity of seeing all the major land areas of the world, they cannot therefore appreciate fully the true significance of the problems which exist in all areas To have worked in only one of these tropical areas is, of course, a disadvantage It is not possible to make entirely valid statements on areas and conditions with which you are not altogether familiar There is, however, a similarity of trend in the nature of the conditions in the tropics throughout the world It is possible to express an opinion of some value having worked for many years in one tropical area With this background and the help of surgical journals from varying parts of the world it is possible to reconstruct the general pattern of disease The experience of doctors working in widely differing areas of the tropical world can usefully be applied to disease bearing a similar pattern

The many excellent textbooks of surgery written concerning conditions as seen in temperate regions of the world appear to be peculiarly "out of focus" when applied to conditions as seen in the tropics It is hoped that this book may help to clarify some points which are not clearly explained elsewhere

Most generations see some advance on the previous one, there is constant improvement in all fields of medical activity Conditions frequently seen twenty years ago in some places are now rare in those areas, as in the case of yaws It is, however, likely that serious conditions will continue to exist for a further century in some parts of the world, in spite of the excellent efforts of the World Health Organisation New conditions are constantly appearing The abolition of one type of disease may well predispose to the coming of another With the ever-increasing use of antibiotic drugs there is a marked increase in the incidence of fungoid diseases A fair number of fatalities from these fungoid diseases, induced by antibiotics, have already been reported[8]

Specialisation in the various branches of surgery is only starting in many countries, and a highly specialised book on surgery in the tropics is at present not likely to be so useful as one which can be consulted with advantage by the doctor in the "one-man" station Medical, surgical and obstetrical cases are frequently all nursed in the same ward, under the supervision of one doctor There are no facilities for separating even clean and septic cases, the only form of segregation which exists is into male patients and female patients, who have

separate wards Such a state of affairs is unfortunate but a fact, grudgingly admitted perhaps by many in authority In spite of these adverse circumstances much good work is achieved This textbook therefore treats all branches of surgical work on a *non specialised basis Staffs are quite inadequate in most* countries to admit of specialisation, other than in the large towns Finances are in many cases insufficient to purchase expensive apparatus The work must be done as well as possible under these adverse conditions No doubt in time the appointment of specialists in the various rather artificial branches of surgery will call for books of a more highly technical nature in tropical surgical work, and these will be written in keeping with the particular interests of the authors

The experience personally gained between the years 1935 and 1945 was most valuable Some of these years were spent in small stations in remote places The experience gained in a country station is very useful Between the years 1945 and 1957 the work was limited to surgery exclusively and it was possible, by dealing with a very large number of cases, to gain much experience in the treatment of conditions which are not frequently seen in smaller centres Obstetrical surgery is a matter of great concern to many junior medical officers, and without including a section on this subject in the present work it is felt that the book would be much less useful The present compilation has been made up from my own experience Sections have been particularly added at the request of doctors working in country stations which were visited shortly before leaving West Africa

The somewhat unorthodox classification may appear a little disconcerting to some and the abolition of the specialty of Ears, Nose and Throat work in favour of Diseases of the Upper Respiratory Tract is not without some consideration There is little doubt that one doctor having to deal with all branches of illness merely considers the ears, nose and throat section one which is little different from others except in as far as it calls for special instruments to get at rather inaccessible parts of the body Delicately constructed tools are in many cases necessary to deal with nasal conditions, but this does not appear a sufficient justification to put these in a class of their own The highly specialised operation of fenestration of the inner ear is one which, so far, is seldom performed in the tropics and which requires special training This book is not being written for specialists but for general medical officers, who are asked to undertake all branches of the work and expected to do so with reasonable skill The further classification of Diseases of the Lower Respiratory Tract might be considered an encroachment on the time-honoured preserves of those more interested in medicine than surgery This limited *view is now untenable In the lower* respiratory tract there are manifestations of disease which require surgical treatment Some diseases affecting the chest even if not directly amenable to surgery must be appreciated in view of the associated surgical complications elsewhere in the body Pulmonary amoebiasis and pulmonary hydatid disease are manifestations of diseases with much wider implications Foreign bodies in the lower respiratory tract require bronchoscopic removal The standard arrangement of many surgical textbooks is dull, and whereas much of the initial information presented is important it is heavy reading, and is added probably only for the sake of completeness

Many conditions described in the standard textbooks though nominally the same as those seen in the tropics vary greatly under tropical conditions in people with very different dietetic habits, and in a different state of nutrition, and with many superadded concomitant conditions In a temperate climate a low-grade increasing colonic obstruction in an adult is certainly most likely to be a carcinoma, this is not necessarily the case in a tropical climate where amœbic dysentery and schistosomiasis are prevalent Amœbiasis of the colon with the formation of an amœboma shows many points with marked similarity to a carcinoma of the colon Amœboma of the colon is a condition much better not operated upon unless an acute emergency arises It can be effectively treated by non-operative means In the case of any mass in the colon in the tropics not only is carcinoma to be considered but also amœbiasis and schistosomiasis In all chronic gut obstruction these conditions should be looked for and a consistent effort made to exclude these diseases before it is concluded that the mass under consideration is a malignant growth

Having myself made most of the mistakes which most juniors make, an attempt is made to put down my considered opinions and record some of my mistakes in the hope that this will help others to avoid the errors which have been made personally There is some value in error if the information gained is used intelligently These notes may also be of value in suggesting conditions which are not well appreciated but which none the less exist Brucellosis of bone is a very perplexing condition till pointed out to you, it should be considered in the case of joint and bone pains associated with low-grade fever Histoplasmosis undoubtedly exists over a wide area of the world, but it is slow in being recognised Toxoplasmosis was first discovered in Africa, few cases, however, have since then been reported from that continent The condition has been noted in Japan, Europe and America, as well as Africa It has a very widespread distribution Coenurus cysts, personally encountered on four occasions, are seldom recognised This small tapeworm cyst condition is scarcely known to many doctors Coenurus cysts have been reported from East Africa [4] and South Africa [5]

The first case of sparganosis or tapeworm muscle abscess personally encountered in West Africa was in 1936 in Gambia Seeing a short tapeworm in a muscle abscess gave rise to a sense of disgust rather than academic interest, unfortunately From the description in the textbooks on tropical medicine "sparganosis" and the "Far East" seem to go hand in hand Cases of sparganosis have recently been reported from Africa,[6] some from Nigeria and some from East Africa If this book brings to the notice of doctors conditions which they have not previously suspected or seen it will have achieved some useful object

In order to get the best consensus of opinion on each subject various journals have been consulted It is obvious that doctors working in an area where certain conditions are common are likely to report cases more freely and with greater accuracy than medical men who see but a few such cases at infrequent intervals Articles written by persons who have seen many cases of any one condition are of great value Hydatid disease associated with sheep-dogs and sheep-farming is common in Australia and South Africa, it is also very frequently seen in several

parts of Siberia, so journals from these areas have therefore been consulted on this subject[–8] Amœboma of the colon seems to be more common in India[9] and China[10] than Africa,[11] so medical periodicals from these large land masses have been referred to on this subject Histoplasmosis, a fungus disease affecting many parts of the body, seems to be recognised frequently in Dutch Guiana[12] and the Southern States of America, also in Africa,[13, 14, 15] though less frequently, so appropriate journals have been noted on this subject from these areas Schistosomiasis is very common in many parts of Africa, particularly Egypt[16] where the infestation is hyperendemic In India it is not a common disease though small areas have been found where a moderate proportion of the population is affected Originality in outlook is attractive and mentally very provocative, and so it was thought that to consult the literature of Soviet Russia might add some original suggestions[1] This has been done with advantage Some excellent articles have been found and valuable information gained from the Russian literature The Russian *Journal of Gynæcology and Obstetrics* was of particular interest[18, 19] The Yugoslav *Medical Review* reports on a very large number of dog-bites and rabies[20] and the conclusions are of considerable value To copy information from book to book is of limited use and predisposes to errors being perpetuated, but to read the original articles of individual surgeons and see in how far they agree or disagree with your own personal experience is of enormous value A list of some of the journals which have been consulted at the library of the Royal Society of Medicine in London, England, is given Many non British journals are written in English, for example the *Chinese Medical Journal* The leading journal from Indonesia is written in English also, though it contains a few articles in Dutch The Indian journals are almost exclusively in English The Russian journals have, since 1956, an English summary to many of the articles but not to all An English translation of the contents of the journal is given in full in some of the journals With the aid of a continental friend many of the articles have been translated into English where an English summary was not available but where the title in the contents suggested that the article might be of value This assistance was most valuable Having made over a thousand extracts from my own notes and the journals of the past seven years, 1950-57, from many areas of the world, a short bibliography of articles is added at the end of each chapter relevant to the text Some important extracts have also been added, these notes may help some readers and may give information in a more consolidated form for reference

Considerable care has been exercised in order to make my extracts as accurate as possible, if, however, errors have been made in extracting the information from the original articles it is hoped that these may be pointed out and corrected as soon as possible Only a few of the more important extracts have been appended The bibliography lists articles referred to, though not necessarily reproduced in the extracts An apology may here be necessary it is not always easy to get the names of the authors correct when one is not familiar with the names Some misrepresentation may unfortunately occur from lack of familiarity with the spelling, some leniency may reasonably be expected in the case of the first edition of any textbook To have errors pointed out is always a help so that

these errors can be corrected at a later date Each journal consulted had its own particular character and each was of special value in its own way The *Central African Journal of Medicine*, edited under the supervision of Dr Michael Gelfand in Rhodesia, is worthy of particular note to those working in Africa, and the easy style in which it is produced adds a special character to it which makes one look forward to the next issue Last but not least was the *Irish Journal of Medical Science* which has a particularly wide range of articles Some of the articles are written by doctors working in Africa under both Government and Missionary Organisations The articles on obstetrics are of particular value to those working in the tropics and the outlook on obstetrical obstruction should be given due consideration

The prevalence of disease is initially very difficult to assess It may take many years to be in a position to express an opinion of value regarding the frequency of a condition in any particular area Enthusiastic newcomers in any area tend to report conditions with inadequate consideration of the literature already collected on the subject It is necessary to exercise caution in this respect Conditions not initially recognised may later be found to be relatively common The figures given for the incidence of the disease in any district reflects more accurately the interest of the medical authorities in the condition concerned rather than the true incidence of the disease Bringing to light the incidence of leprosy illustrates this very well Since the introduction of drugs which have a beneficial effect on leprosy, patients naturally come more willingly for treatment, and the presence of the malady becomes more apparent It is of value to keep a personal record book for observations noted and errors committed The full import of what is noted may at the time be not fully appreciated, but the information may be of value at a later date An accurate knowledge of the manifestation of disease as seen in skin conditions is important as skin conditions bear visible evidence of deep seated disease The *Handbook of Tropical Dermatology*, by Simons of Leyden, in Holland, published in English, is most useful in this respect, with excellent photographs and good descriptions of the conditions under consideration There are no rigid geographical limits to the distribution of tropical diseases Malaria has occasionally been contracted in England and is not unduly uncommon in Holland It is frequently seen all along the southern parts of the Continent of Europe The increase of speed of travel by air transport makes it possible for tropical diseases to be carried to any part of the world within a few days The practice of sending pathogenic germs from one part of the world to the other by air transport, with a view to laboratory investigations, appears to be not without considerable danger Virulent bacillæ can be carried on dry paper for a prolonged time, and the intentional contamination of paper as a means of sending pathogenic material for investigation has been practised between the Far East and Europe The intentional spreading of disease for belligerent purposes has been reported Such a practice is mentioned only to be condemned The influence of climate seems to be considerable in determining the prevalence of disease A large area of the rather arid country of South West Africa appears to be unique in the fact that malaria is not seen in that part of Africa,[21] or is certainly extremely rare The rainfall is below 5 in per year,

this, no doubt, adversely affects the breeding of mosquitoes In the same area schistosomiasis does not appear to occur either Both these diseases are predisposed to by swampy country which permits of the breeding of the vectors which carry the disease In dry, rather arid country, diseases of the relapsing fever group are common Brucellosis is also not uncommon in rather hot dry countries In the practice of tropical surgery it is important to appreciate the disposition of the people one is working amongst, and ability to see the other person's point of view is always a great help Most communities have their particular likes and dislikes, and it is wise to consider how treatment may be adjusted to suit the wishes of the people without detracting from its efficiency , with sympathetic consideration for a patient's feelings it will be found that most patients are very co-operative indeed, and with mutual understanding on both sides much excellent work can be done even under rather adverse conditions

Having taken some time off to put together the information collected, from my own notes of many years, and observations made on photographs, it is hoped that this book will help some even if it is adversely criticised by others Criticism must be taken in good part Suggestions and photographs are always helpful, and these may be useful in improving the description and illustrations already submitted where the available information was very limited at the time of writing A good camera is of great value as a means of aiding clinical records, and it is strongly advised that all junior doctors should go to the trouble of getting a good camera A 35 mm camera is the most convenient size made To be without a camera in early years will be regretted in later years Most of the photographs in this book were taken during my ward rounds or in the Out patient Departments , some were taken in the theatre during operations with a sterile towel put round the camera and then discarded Out of a collection of over 2,000 pictures a limited number have been selected to illustrate points mentioned in the text Some of the photographs have kindly been supplied by my colleagues, illustrating conditions of which there was no picture available in my series

REFERENCE LIST OF JOURNALS CONSULTED

West African Medical Journal
East African Medical Journal
Central African Journal of Medicine
South African Medical Journal
Indian Journal of Medical Science
Indian Medical Gazette
Journal of Obstetrics and Gynaecology of India
Indian Practitioner
[illegible]
[illegible] and Indonesia
[illegible]
Irish Journal of Medical Science
British Medical Journal
Lancet (England)

American Journal of Tropical Medicine and Hygiene
Transactions of the Royal Society of Tropical Medicine and Hygiene (England)
Annals of Tropical Medicine and Parasitology (England)
Russian Journal of Surgery (*Khirurgiya*)
Medical Review Journal of Serbian Medical Association (Yugoslavia)
Journal of Gynæcology and Obstetrics of Russia
Deutsche Medizinische Wochenschrifte (Germany)
Journal of Tropical Medicine and Hygiene (England)
British Journal of Urology
British Journal of Plastic Surgery
Australian and New Zealand Journal of Surgery
And others

REFERENCES

1 KERR, W G (1957) *Surgery A Guide to Surgical Diagnosis and Treatment, including Tropical Surgery* Oxford University Press
2 CHATTERJI, K K (1927) *Tropical Surgery and Pathology in the Tropics* London John Bale Sons & Danielsson
3 KARAMCHANDI, P V (1956) Adverse effects of antibiotics *Indian Practit* 9, 525
4 RAPER, A B & DOCKERY, G C (1956) Coenurus cysts in man, five cases from East Africa *Ann trop Med Parasit* 50, 121
5 BECKER, B J P (1951) Infestation of human brain with *Coenurus cerebralis* *Lancet*, 11, 198
6 KIREMERWA, D N, *et al* (1956) Sparganosis with report of two cases *E Afr med J* 33, 37
7 FITZPATRICK, S C (1950-51) *Sequelæ of treatment of hydatid disease of the lung* *Aust N Z J Surg* 20, 278
8 LVOV, A N (1957) Pulmonary echinococcosis *Khirurgiya*, 1, 75
9 KASLIWAL, R M (1954) Clinical manifestations of amœbiasis *Indian J med Sci* 8, 741
10 SMITH, S L H, *et al* (1949) Amœboma in the diagnosis of abdominal swellings *China med J* 67, 19,
11 ANDERSON G V W (1953) Surgical complications of amœbiasis *E Afr med J* 30, 467
12 COLLIER, W A, *et al* (1953) The histoplasmine test in Surinam *Docum neerl geogr trop* 5, 103
13 DEAN, G (1957 Cave disease *Cent Afr J Med* 3, 79
14 DAVIES, P (1957) A fatal case of histoplasmosis contracted in Kenya *E Afr med J* 34, 555
15 SILVERA, N D, *et al* (1954) A case of histoplasmosis duboisii infection *W Afr med J* 3, 32
16 IBRAHIM, H (1957) Combined ligation of hepatic and splenic artery in Egyptian splenomegaly *J Egypt med Ass* 40, 253
17 BREGADZI, I L (1957) Surgical intervention in alveolar echinococcus of liver *Khirurgiya*, 3, 26
18 PETCHENCO, A I (1957) New method of promoting and concluding labour *Akus i Ginek* 6, 15
19 SPERANSKAYA, L N (1957) Gathering placental blood and using it in obstetrical practice *Akus i Ginek* 4, 105
20 NIKOLIC, M (1953) *Antitetanic serum in bite wounds* *Med Rev Belgrade*, 6, 426
21 HELMAN J (1957) Some diseases amongst the Hottentots of South-West Africa *Cent Afr J Med* 3, 143

2

Nutrition relative to Surgery

THE general nutritional state of patients in the tropics presenting themselves for operation varies enormously Some patients are magnificent specimens of humanity while others are in a deplorably low state of general health Operations may carry a very low risk in the healthy, though no operation is devoid of risk, and this should always be remembered In the chronically undernourished patient, whatever disease is present as his primary complaint, his state of nutrition is most important, and in those suffering from malnutrition any operation may carry an unjustifiably high risk Many patients are in poor *general health as a result of a combination of five conditions* worm *infestation*, malaria of a chronic type, avitaminosis, anæmia, and a varying degree of hypoproteinæmia Such is the rule rather than the exception in more than 30 per cent of the cases at the first visit Patients do not usually appreciate the low state of their general health but it behoves the doctor to do so To comment to the patient on his poor health and unsuitability for operation disappoints him , to do so would suggest a lack of interest in him and his individual case It is always wise to show an interest in his personal complaints without emphasising what he does not appreciate himself, his poor general condition He may be suffering from a simple hernia, the treatment of which in an otherwise healthy person carries a very low risk Judging that it would take not less than four weeks to improve his general health, it pleases him to accept preliminary treatment in preparation for the big event, his operation He can be told, with fair accuracy, that to make his operation as safe as possible he must take a preliminary course of medicines covering a period of four weeks Such a time interval allows him time for nutritional treatment and to make the necessary domestic arrangements for his family Hospital beds can be more easily adjusted by encouraging admission by timed arrangement Four weeks allows sufficient time to give treatment for the four main conditions from which he is suffering, apart from the hernia which he complains of

All forms of malnutrition can be improved to the extent of about 1 per cent per day with treatment, and so four weeks nutritional treatment usually brings patients into the safe nutritional level from the very unsafe nutritional level by the addition of 30 per cent improvement in all respects without an undue loss of time A patient with a hæmoglobin level of 80 per cent is a much lower surgical risk than one with a 50 per cent hæmoglobin level The same can be said for the other factors, though they are not so easy to measure at the bedside Chronic malaria can be treated with antimalarial drugs Worm infestations can be treated on one or two occasions during this time Anæmia responds quickly

to iron tonics If no active loss of blood is occurring, the hæmoglobin can be raised at the rate of 1 per cent per day usually Some degree of avitaminosis can also be treated Advice regarding a temporary increase in the protein food is advisable This four weeks of preparation is very well spent time—or we might say very well wasted time

Most patients accept this form of regime very amicably, and it is of great pre operative value It decreases the operative risk considerably It saves many complications and helps both the patient and the doctor to carry through the treatment efficiently for the condition which the patient first complained of In some cases it may be necessary to treat the skin area in the anticipated site of the operation if skin abnormalities exist A few days in hospital before the operation is also a help if space can be afforded for the patient to have adequate rest and sleep To get to know the staff before operation is an advantage He becomes familiar with the routine of hospital regime One further clinical examination in the wards before operation is always advisable A limited time is also necessary in which to carry out laboratory tests where these are required Sickle cell disease in the tropics is a serious risk in African children and young adults about to undergo serious operations The risk appears to decrease progressively after the age of 20 and is present but to a lesser degree up to the age of 30 After the age of 30 years it is not of serious import Sickle cell disease affects only a limited section of people in the tropics and is confined to those of African origin almost exclusively

Hypoproteinæmia is seen mainly in two classes of patients, in young children with kwashiorkor disease, or nutritional œdema as it is called in some places, though it has other factors concerned in its causation as well as nutrition alone Hypoproteinæmia is also seen in patients over the age of 40 It is necessary to consider a little more fully the factors which are responsible in each case for the general nutritional state of individual patients before operation, these will be considered under five sub-headings

1 Fluid balance
2 Salts
3 Vitamins
4 Proteins in serum
5 Hæmoglobin contents

FLUID BALANCE

A patient who is severely dehydrated develops some degree of the "hollow-eyed" appearance This characteristic appearance is easily noted in both adults and infants when extreme degrees of fluid loss have taken place, it is not difficult to recognise In patients suffering from lesser degrees of dehydration it is not easily detected by the patient's appearance most patients who are dehydrated feel thirsty This is one of nature's ways of encouraging adjustment of fluid balance Babies cannot ask for fluids but it is necessary to recognise the appearance of a child who is suffering from dehydration who is too ill to take water or milk It is usually not a practical proposition to carry out complicated tests to estimate the degree of dehydration in patients Limited

facilities and inadequate skill preclude these tests being done in country stations Rogers,[1] however, working in India many years ago, suggested a method of estimating the degree of dehydration with reasonable efficiency, and in a manner which is not complicated, he was dealing with cholera patients

This test of course can be used for any other type of patient suffering from a degree of dehydration An extract indicating the method is given at the end of the chapter for those who wish to adopt the procedure The test depended on the density of the blood and its behaviour in a series of glycerin solutions of varying strength Most dehydrated patients are dehydrated because they do not absorb fluid from the lower bowel

Fluid may be taken by the mouth, but it does not reach the colon because of intestinal obstruction or some other disease interfering with the mechanism of fluid absorption, possibly as a result of toxic vomiting

The essential need is to get rid of the cause of the condition which prevents the fluid absorption, whether it is in the large gut or in the upper intestine, or due to some condition of toxæmia A patient's condition may be so poor on admission to hospital as to render operative relief of the obstruction very hazardous Three alternative methods of fluid administration may be considered If fluid cannot be taken by the mouth, or when taken by the mouth cannot proceed to the lower bowel, it is necessary to adopt one of the other methods The other three alternative methods are the absorption of fluid through the rectum, the administration of fluid intravenously or by giving fluid through the subcutaneous tissues Nature's way is the best way, but if it is not possible to take fluid by the mouth the nearest alternative is to give fluid by the rectum The advantage of taking fluid by the mouth or the rectum is that the absorption is regulated by a natural process A mother need not worry that her child will drink too much water, so, too, a doctor need not worry that a patient may absorb too much fluid by the rectum When the patient is adequately hydrated he will cease to absorb fluid from the rectum, and if fluid continues to enter the rectum it will not be absorbed, and is in fact soon ejected Murphy's rectal drip method of giving fluid per rectum is very safe and physiologically sound The regulation of the fluid intake is determined physiologically by the normal body absorption mechanism The difficulty and expense of maintaining an adequate supply of sterile bottle fluid for intravenous use is considerable in remote parts of the world The rectal drip method of giving fluid should be used much more freely than it is, as it is physiologically more normal than the much used and frequently abused method of intravenous administration An angled glass tube with several perforations in it was originally used, but any form of rectal tube suffices Rubber apparatus is less easily damaged than glass material Intravenous fluid has very few advantages, if any, over the rectal method and is much more dangerous in patients in a weak condition Rectal fluid is absorbed very quickly in patients requiring fluids but less quickly in patients not requiring fluids so urgently A very dehydrated patient may take fluid at the rate of 60 drops to the minute for the first pint without expelling fluid from the rectum, but during the administration of the second pint the rate must be reduced so that with the slower absorption an excess of fluid does not accumulate locally

One litre of tap water per rectum with a teaspoonful of salt added costs less than one penny and is in most cases equally efficient as a litre of a highly refined saline preparation for intravenous administration

The administration of sodium chloride is desirable in all cases where dehydration is associated with vomiting, to replace the chlorides lost by ejected gastric contents The matter of fluids and sedatives post-operatively will be discussed under operative technique

It can be taken as a fair estimate that a patient who has an inflammatory intestinal lesion, whether associated with obstruction or not, will benefit from the administration of 2 pints of rectal fluid before operation In most cases such patients suffer from a moderate degree of dehydration and in many cases a marked degree of dehydration Fluid taken by mouth does not reach the lower bowel, and gets held up by the obstructive condition or vomited out again by the disturbed action of the upper bowel such patients are suffering from dehydration in spite of the water taken by mouth Pre operative tap water per rectum, with or without salt added, can be given to the patient while the theatre is being prepared, and is an advantage in all emergency cases The addition of 20 gr potassium bromide and 20 gr chloral hydrate is an advantage This pre-operative medication quietens the patient without necessarily depressing him It is necessary to give atropine just before the operation where general anæsthetic is to be administered

An absence of chloride in the urine suggests the need for addition of salt, such a test carried out on the urine is of interest but not very necessary To add chloride to the first pint of fluid given per rectum is safe and in most cases desirable If a second pint of fluid is given, salt can be added if it is thought necessary, but a dram of salt added to the first pint of fluid will help to get the patient over the initial emergency

Patients with fæcal fistula become dehydrated and depleted of chloride in varying degrees, depending on the severity of the fistula, if for any reason temporary ileostomy is necessary, rectal fluids containing chloride should be started at once to make up for the loss of upper bowel fluids Do not wait for the patient's condition to deteriorate

Intravenous saline or saline glucose replaces lost fluids quickly and may be necessary in urgent cases when the patient cannot tolerate fluid per rectum, but intravenous fluid should not be given as a routine Glucose solution with saline, if given as a subcutaneous infusion in strength beyond 5 per cent, may cause sloughing of subcutaneous tissue It is advisable in subcutaneous infusion to use saline alone rather than saline in glucose It is always better to adopt methods which are efficient and safe than those which are efficient but dangerous at times Pre-operative and post operative rectal fluids should therefore be used rather than intravenous administration if they suffice for the purpose for which they are required The initial enthusiasm for the use of intravenous fluids declined considerably after reports of fatalities following their use Intravenous fluid has an important but limited use Most doctors would not use intravenous fluids so freely if they had to purchase them themselves They are expensive out of all proportion to their advantage A limited supply of sterile bottles of saline for

intravenous use in emergency is desirable, as in a small number of cases it may be essential

Dextraven is a popular plasma substitute but it should not be used in toxæmic cases as it decreases the urine output to some extent in pre-eclamptic toxæmic patients The usual teaching regarding the fluid requirements of the body for twenty four hours is that 5 pints are required, from my personal experience it is suggested that this is in excess of the requirement, and that patients feel better if they are given in the level of 4 pints in the twenty-four hours following operation When they are well enough to regulate their own fluid balance by taking water by mouth, artificial means of fluid intake can of course be stopped, as they will return again to the natural way of taking fluids to maintain the balance of fluids It seems a safe procedure to give a patient who cannot take fluids easily by mouth 2 pints of fluid per rectum morning and evening for the first two days following operation, after this time he will return to the normal method of taking fluids himself It should not be forgotten that it is an advantage to take fluid other than ordinary water or saline per rectum Rectal saline can be supplemented by the addition of milk or thin soup In tiny infants it is an advantage to add the mother's milk to the rectal feeds

SALTS

One of the factors in the maintenance of health is the proper level and balance of salts in the blood There are many inorganic salts in the blood, each being maintained at a constant level [2] Organic salts in the blood are the products of metabolism There are only three inorganic salts which can be artificially regulated in clinical practice with any degree of ease These salts are sodium, potassium and calcium The chloride level is normally maintained by the ingestion of chlorides in food A fall in blood chloride level occurs following vomiting and excessive sweating In surgical cases the main condition which gives rise to blood chloride reduction is vomiting Replacement of the chlorides lost can be undertaken by giving the patient intravenous saline or saline per rectum if he cannot retain fluids by mouth Saline by mouth, in a patient that is vomiting, is of little advantage In most forms of kidney inflammation or kidney degeneration there is a retention of chlorides with resulting œdema of the tissues The fluid retention is apparent by visible swelling in many parts of the body, face, abdomen and legs The pulmonary respiratory exchange mechanism alters the acid base balance of the blood and in this way indirectly affects the salt level The chloride level of the blood is also influenced by the amount of fluid lost through the skin in sweating In climates where the humidity is very variable the balance is less steady than it is in temperate climates The suprarenal gland, the pituitary gland and the parathyroid glands are among the ductless glands that play an important part in the regulation of salts in the circulation A disturbance of the normal level of serum potassium or blood calcium gives rise to very marked clinical changes in a patient Hyperpotassæmia gives rise to a marked drowsiness and lowering of activity of the nervous system A raised calcium level also gives rise to a degree of drowsiness, but a lowering of the

available blood calcium in circulation gives rise to tetany, as may be seen temporarily following extensive thyroid operations Post-operative tetany usually gets well without treatment, but the temporary discomfort and alarm caused by the spasms induced can be much relieved by the intravenous administration of calcium Whereas it may be necessary to make an effort to help a patient to eliminate organic salts, organic salts are seldom administered intravenously in treatment The giving of glucose intravenously in hypoglycæmia is an exception, though this is not often necessary in surgical cases Most biochemical tests undertaken to estimate the level of salts in the blood are complicated laboratory procedures, special apparatus and materials are required

A list of figures is appended for reference to normal levels for inorganic blood salts These may be found useful in helping to understand clinical conditions described where reference is made to blood salt levels If an excess of sodium is given to a healthy individual, he excretes the excess quite rapidly Sodium chloride is very non-toxic in healthy persons unless given in enormous quantities or with inadequate water to help to excrete it These toxic hyperchlorhydric symptoms were noted in tropical countries on several occasions in war time in shipwrecked sailors deprived of fresh water in a hot sunny climate in open boats They were tempted, in their desperation, to drink sea water as a last resort with aggravation of their symptoms Salt retention with œdema occurred and the *persons were critically ill in many cases A lowering of the blood chloride also* produces a very adverse effect in patients

In surgery in the tropics the maintenance of an adequate chloride balance in the blood is most important Artificial replacement of chlorides should be undertaken in all patients who are depleted of chlorides by vomiting for any reason, replacement of fluids and chlorides go together Rectal or intravenous administration of saline are the best methods of replacing chlorides in patients who are vomiting Chlorides are usually given in a strength of 1 per cent The normal serum chloride is approximately 0 9 per cent saline strength, 1 dram of sodium chloride to a pint of fluid gives approximately a normal solution If saline is being given per rectum it is better to use a dram of sodium chloride to a litre of water, this gives the strength below that of normal saline Fluid is absorbed much more quickly if this is done and thus is an advantage It has been found on analysis that drowsiness associated with neurotoxic snake-venom poison is associated with a high level of blood potassium A high potassium serum level also occurs following stings of certain poisonous fish Cortisone has a very marked effect in counteracting this hyperpotassæmia and associated drowsiness An injection of hydrocortisone in colubrine snake-bite cases has quite a dramatic effect, which is thought to be due to the beneficial effect of lowering the serum potassium The normal blood calcium level is also disturbed in some tropical conditions, notably with sprue with the associated tetany at times The laryngeal spasm of hydrophobia or rabies may also be associated with low calcium level, this giving rise to spasm of the larynx There is much room for investigation on such tropical conditions Those who have facilities to undertake such investigations should be encouraged to report their result for the benefit of others The information available is so far very inadequate, unless accurate investigations

are undertaken, treatment will remain empirical in many cases as it is not certain what one must counteract, and treatment will continue to remain a matter of trial and error

Calcium appears to be a drug which can be given quite safely intravenously, it is usually prepared in ampoules of calcium gluconate Some patients get rather alarmed following calcium gluconate intravenously, as it gives a peculiar tingling sensation soon after the injection It is wise to warn patients that this will happen but is not dangerous Most patients who have suffered from intestinal obstruction are found to be passing very little chloride in the urine as a result of lost chloride from the vomiting of material containing hydrochloride acid from the stomach When a normal blood chloride is reached the patient again starts to excrete chloride in the urine It is not difficult to test for chloride in urine The use of Ringer's solution or Lock's solution instead of normal saline does not appear to be an advantage, these solutions contain additional salts which approximate to those found in serum The detection of sugar in urine is important clinically When the blood sugar runs above the normal level of 0 08 to 0 12 per cent solution it is excreted in the urine

The older method of testing urine by using Fehling's solution is frequently neglected because of slight inconvenience of keeping the solution available, and also in the tropics the spirit lamp invariably contains no spirit The spirit evaporates very quickly in a high temperature The use of Clinistix, which are most useful, get over much of the difficulty These are small prepared sticks of paper which are used like litmus paper but they are indicator strips made to detect sugar It is very simple indeed to take one of these and dip it in the urine and look for the colour which comes out very close to that given by Fehling's solution test pale green for a trace of sugar, strong green for a higher amount of sugar and the brick reddish colour when the amount of sugar approximates 1 per cent These Clinistix are well worth getting and should be kept in stock

A very interesting point has recently been noted by workers in Sweden namely, that patients who have a blood chloride level above normal appear to lose their hair very rapidly, and in any conditions where the kidneys are affected and excretion of salts is below normal the blood chloride level remains slightly above normal—this is associated with a loss of hair This high blood chloride level is probably the explanation of the loss of hair in kwashiorkor disease It is commonly heard that a patient lost a lot of his hair during his recent illness, but now that he is better his hair is improving A scientific explanation of the observation has not previously been given and so this experimental work is of considerable interest [3]

Some tests for organic salts in urine are quite simple Chemical tests have been used for the detection of pregnancy These chemical tests can be used in small stations Biological tests for œstrogens are more time-consuming to carry out, but are very accurate Small animals and frogs can be injected with urine to carry out pregnancy tests Male frogs of several varieties can be used and are suitable More details as to how the tests are done are given elsewhere

The post-operative administration of normal saline is an advantage at a time when the patient is unable to drink fluid by mouth and maintain his normal

available blood calcium in circulation gives rise to tetany, as may be seen temporarily following extensive thyroid operations Post-operative tetany usually gets well without treatment, but the temporary discomfort and alarm caused by the spasms induced can be much relieved by the intravenous administration of calcium Whereas it may be necessary to make an effort to help a patient to eliminate organic salts, organic salts are seldom administered intravenously in treatment The giving of glucose intravenously in hypoglycæmia is an exception, though this is not often necessary in surgical cases Most biochemical tests undertaken to estimate the level of salts in the blood are complicated laboratory proc[illegible]

salts

described where reference is made to blood salt levels If an excess of sodium *is given to a healthy individual, he excretes the excess quite rapidly Sodium* chloride is very non toxic in healthy persons unless given in enormous quantities or with inadequate water to help to excrete it These toxic hyperchlorhydric symptoms were noted in tropical countries on several occasions in war time in shipwrecked sailors deprived of fresh water in a hot sunny climate in open boats They were tempted, in their desperation, to drink sea water as a last resort with aggravation of their symptoms Salt retention with œdema occurred and the persons were critically ill in many cases A lowering of the blood chloride also produces a very adverse effect in patients

In surgery in the tropics the maintenance of an adequate chloride balance in the blood is most important Artificial replacement of chlorides should be undertaken in all patients who are depleted of chlorides by vomiting for any reason, replacement of fluids and chlorides go together Rectal or intravenous administration of saline are the best methods of replacing chlorides in patients who are vomiting Chlorides are usually given in a strength of 1 per cent The normal serum chloride is approximately 0 9 per cent saline strength, 1 dram of sodium chloride to a pint of fluid gives approximately a normal solution If saline is being given per rectum it is better to use a dram of sodium chloride to *a litre of water, this* gives the strength below that of normal saline Fluid is absorbed much more quickly if this is done and thus is an advantage It has been found on analysis that drowsiness associated with neurotoxic snake venom poison is associated with a high level of blood potassium A high potassium serum level also occurs *following stings of certain poisonous fish Cortisone has a very* marked effect in counteracting th[illegible] drowsiness
An injection of hydrocortisone in[illegible]
effect, which is thought to be du[illegible]
potassium The normal blood calcium level is also disturbed in some tropical conditions, notably with sprue with the associated tetany at times The laryngeal spasm of hydrophobia or rabies may also be associated with low calcium level, this giving rise to spasm of the larynx There is much room for investigation on such tropical conditions Those who have facilities to undertake such investigations should be encouraged to report their result for the benefit of others The information available is so far very inadequate, unless accurate investigations

are undertaken, treatment will remain empirical in many cases as it is not certain what one must counteract, and treatment will continue to remain a matter of trial and error

Calcium appears to be a drug which can be given quite safely intravenously, it is usually prepared in ampoules of calcium gluconate Some patients get rather alarmed following calcium gluconate intravenously, as it gives a peculiar tingling sensation soon after the injection It is wise to warn patients that this will happen but is not dangerous Most patients who have suffered from intestinal obstruction are found to be passing very little chloride in the urine as a result of lost chloride from the vomiting of material containing hydrochloride acid from the stomach When a normal blood chloride is reached the patient again starts to excrete chloride in the urine It is not difficult to test for chloride in urine The use of Ringer's solution or Lock's solution instead of normal saline [illegible] l salts which is important [illegible] to 0 12 per cent solution it is excreted in the urine

The older method of testing urine by using Fehling's solution is frequently neglected because of slight inconvenience of keeping the solution available, and also in the tropics the spirit lamp invariably contains no spirit The spirit evaporates very quickly in a high temperature The use of Clinistix, which are most useful, get over much of the difficulty These are small prepared sticks of paper which are used like litmus paper but they are indicator strips made to detect sugar It is very simple indeed to take one of these and dip it in the urine and look for the colour which comes out very close to that given by Fehling's solution test pale green for a trace of sugar, strong green for a higher amount of sugar and the brick reddish colour when the amount of sugar approximates 1 per cent These Clinistix are well worth getting and should be kept in stock

A very interesting point has recently been noted by workers in Sweden, namely, that patients who have a blood chloride level above normal appear to lose their hair very rapidly, and in any conditions where the kidneys are affected and excretion of salts is below normal the blood chloride level remains slightly above normal—this is associated with a loss of hair This high blood chloride level is probably the explanation of the loss of hair in kwashiorkor disease It is commonly heard that a patient lost a lot of his hair during his recent illness, but now that he is better his hair is improving A scientific explanation of the observation has not previously been given and so this experimental work is of considerable interest [3]

Some tests for organic salts in urine are quite simple Chemical tests have been used for the detection of pregnancy These chemical tests can be used in small stations Biological tests for œstrogens are more time-consuming to carry out, but are very accurate Small animals and frogs can be injected with urine to carry out pregnancy tests Male frogs of several varieties can be used and are suitable More details as to how the tests are done are given elsewhere

The post-operative administration of normal saline is an advantage at a time when the patient is unable to drink fluid by mouth and maintain his normal

chlorides One litre of normal rectal saline with sedatives added to it is an advantage in all major operation cases of a serious nature It is not necessary after hernia operations and those of the low-risk type where there is a low blood loss and little shock associated Hypochloræmia gives rise to a sense of weakness, there is a tendency to muscle cramps with sweating and pallor Those signs are noted in heatstroke, they can be relieved to a considerable extent by the appropriate administration of chlorides

VITAMINS

An appreciation of the importance of vitamins is essential to all surgeons In areas of the world where there is a marked deficiency of vitamins in the diet it is the more important The foodstuffs available in many places are very poor in vitamin quality, in other areas vitamins may be adequate enough in the food grown locally, but the vitamins are damaged by excessive cooking of food, which is a common fault in areas where life is simple and means are low The unhealthy state of the mucous membrane of the upper intestines in some patients prevents the adequate absorption of vitamins If absorption of vitamins is inadequate a patient will show clinical evidence of avitaminosis A shortage of any of the vitamin groups gives rise to a fairly clear-cut clinical picture The letters A, B, C and D indicate groups of vitamins There are several more, and subdivisions of each of these groups, some already known and others will no doubt be described as time goes on A very large volume of literature has been accumulated on the subject of vitamins Whereas the information is of considerable interest, much of it is quite irrelevant to clinical surgery It is proposed here to consider only such points as have a direct bearing on surgical practice, and the state of the patient, relative to his suitability for any operation he may require, without running undue risks To include more than this would make the text unduly long and be only a matter of recording information which has already been recorded very well in medical textbooks with great detail Laboratory tests have been devised for the detection of the vitamins and the varying degrees of avitaminosis in patients It is unlikely that they will be required in surgical patients

Working in a district where avitaminosis is prevalent it becomes quite easy to recognise patients suffering from the major degrees of deficiency disease It is unwise to undertake operations of a non-urgent nature in patients who show a visible degree of avitaminosis There is no doubt that it is a safe and wise rule to give all patients undergoing non-urgent operations a preliminary course of multiple vitamins This procedure decreases the surgical risk for several reasons If patients have an adequate supply of vitamins, surgical wounds heal much more quickly and satisfactorily, there is a decreased risk of infection The risk of post-operative surgical complications is lowered Post operative bronchitis occurs less frequently Manukian [4] adds to this list the unduly high incidence of hæmatoma formation in the wound in patients suffering from a degree of avitaminosis C and the frequency with which post operative incisional hernia is noted It is unwise to undertake non urgent operations without one month's preliminary treatment with a view to attending to a patient's general health and

state of nutrition Emergency operations have to be undertaken irrespective of the risk An adequate supply of vitamin A is essential for the nutrition of the upper and lower respiratory tract, also for the nutrition of the skin and particularly for the nutrition of the eye tissues Patients suffering from marked degrees of vitamin A deficiency are very likely to get chest complications following general anæsthesia In vitamin A deficiency the nutrition of the skin tends to be poor Healing of wounds is slow and unsatisfactory The three areas of the skin which appear to give way easily in vitamin A deficiency are the cheek, the buttocks and the pudendal areas These are all areas where, more than elsewhere in the body, the skin has beneath it a pad of fat Possibly the initial defect is an unhealthy state of the endothelium of the blood vessels supplying the fatty pad, with a resultant thrombosis and a thrombotic gangrene Fat has a poor blood supply, the overlying unhealthy skin gives way secondarily

The eye is very likely to be affected in vitamin A deficiency There is a liability of the eye tissues to give way in vitamin A deficiency if the patient suffers from an infective condition This is seen particularly in measles During an outbreak of measles in West Africa during 1957 a high proportion of the affected children developed conjunctivitis, keratitis and corneal ulceration, and within two weeks of the onset of the infection were totally blind It should be made a rule that all children suffering from measles in the tropics should be given vitamin A before they show evidence of eye complications Vitamin A by injection is the best method of ensuring a good supply of this substance quickly It is also an advantage to give penicillin at an early stage One of the long-acting penicillin substances saves multiple needle punctures and this is of particular advantage in children The eye complications are a most serious risk In the epidemic recently encountered up to 50 per cent of the children in some areas became totally blind The matter of eye complications will be dealt with in more detail under the section on eye conditions Measles is usually considered to be a medical condition, but unfortunately corneal ulcers are sent to surgical departments as well as patients with blind eyes It is therefore considered permissible to mention this condition to illustrate the importance of vitamins

Many conditions could be mentioned to illustrate the point of the importance of anticipating the danger rather than having to undertake some heroic measures in an attempt to rectify some complication which might well have been avoided had it been anticipated in time These cases were not under my care but were examined and photographed during a consultation visit One photograph (Fig 1) shows an unfortunate child whose life has been spoiled by loss of sight directly due to avitaminosis Many blind children were seen in the same ward as this child at the same time Children suffering from cancrum oris (Fig 2), involving the cheek as well as elsewhere, are invariably in very poor nutritional condition They are usually suffering from multiple nutritional deficiencies Avitaminosis is only one part of malnutrition It is difficult to estimate to exactly what extent each of the factors concerned is responsible for the low state of health The prognosis of cancrum oris cases is poor and there is a death rate of not less than 40 per cent in spite of treatment Such patients as recover frequently have marked disfigurement

chlorides One litre of normal rectal saline with sedatives added to it is an advantage in all major operation cases of a serious nature It is not necessary *after hernia operations and those of the low-risk type where there is a low blood* loss and little shock associated Hypochloræmia gives rise to a sense of weakness, there is a tendency to muscle cramps with sweating and pallor Those signs are noted in heatstroke, they can be relieved to a considerable extent by the appropriate administration of chlorides

VITAMINS

An appreciation of the importance of vitamins is essential to all surgeons In areas of the world where there is a marked deficiency of vitamins in the diet it is the more important The foodstuffs available in many places are very poor in vitamin quality, in other areas vitamins may be adequate enough in the food grown locally, but the vitamins are damaged by excessive cooking of food, which is a common fault in areas where life is simple and means are low The unhealthy state of the mucous membrane of the upper intestines in some patients prevents the adequate absorption of vitamins If absorption of vitamins is inadequate a patient will show clinical evidence of avitaminosis A shortage of any of the vitamin groups gives rise to a fairly clear-cut clinical picture The letters A, B, C and D indicate groups of vitamins There are several more, and subdivisions *of each of these groups, some already known and others will no doubt be* described as time goes on A very large volume of literature has been accumulated on the subject of vitamins Whereas the information is of considerable interest, much of it is quite irrelevant to clinical surgery It is proposed here to consider only such points as have a direct bearing on surgical practice, and the state of the patient, relative to his suitability for any operation he may require, without running undue risks To include more than this would make the text unduly long and be only a matter of recording information which has already been recorded very well in medical textbooks with great detail Laboratory tests have been devised for the detection of the vitamins and the varying degrees of avitaminosis in patients It is unlikely that they will be required in surgical patients

Working in a district where avitaminosis is prevalent it becomes quite easy to recognise patients suffering from the major degrees of deficiency disease It is unwise to undertake operations of a non urgent nature in patients who show a visible degree of avitaminosis *There is no doubt that it is a safe and wise rule* to give all patients undergoing non-urgent operations a preliminary course of multiple vitamins This procedure decreases the surgical risk for several reasons If patients have an adequate supply of vitamins, surgical wounds heal much more quickly and satisfactorily, there is a decreased risk of infection The risk of post-operative surgical complications is lowered Post-operative bronchitis occurs less frequently Manukian [4] adds to this list the unduly high incidence of hæmatoma formation in the wound in patients suffering from a degree of avitaminosis C and the frequency with which post-operative incisional hernia is noted It is unwise to undertake non-urgent operations without one month's preliminary treatment with a view to attending to a patient's general health and

state of nutrition Emergency operations have to be undertaken irrespective of the risk An adequate supply of vitamin A is essential for the nutrition of the upper and lower respiratory tract, also for the nutrition of the skin and particularly for the nutrition of the eye tissues Patients suffering from marked degrees of vitamin A deficiency are very likely to get chest complications following general anæsthesia In vitamin A deficiency the nutrition of the skin tends to be poor Healing of wounds is slow and unsatisfactory The three areas of the skin which appear to give way easily in vitamin A deficiency are the cheek, the buttocks and the pudendal areas These are all areas where, more than elsewhere in the body, the skin has beneath it a pad of fat Possibly the initial defect is an unhealthy state of the endothelium of the blood vessels supplying the fatty pad, with a resultant thrombosis and a thrombotic gangrene Fat has a poor blood supply, the overlying unhealthy skin gives way secondarily

The eye is very likely to be affected in vitamin A deficiency There is a liability of the eye tissues to give way in vitamin A deficiency if the patient suffers from an infective condition This is seen particularly in measles During an outbreak of measles in West Africa during 1957 a high proportion of the affected children developed conjunctivitis, keratitis and corneal ulceration, and within two weeks of the onset of the infection were totally blind It should be made a rule that all children suffering from measles in the tropics should be given vitamin A before they show evidence of eye complications Vitamin A by injection is the best method of ensuring a good supply of this substance quickly It is also an advantage to give penicillin at an early stage One of the long-acting penicillin substances saves multiple needle punctures and this is of particular advantage in children The eye complications are a most serious risk In the epidemic recently encountered up to 50 per cent of the children in some areas became totally blind The matter of eye complications will be dealt with in more detail under the section on eye conditions Measles is usually considered to be a medical condition, but unfortunately corneal ulcers are sent to surgical departments as well as patients with blind eyes It is therefore considered permissible to mention this condition to illustrate the importance of vitamins

Many conditions could be mentioned to illustrate the point of the importance of anticipating the danger rather than having to undertake some heroic measures in an attempt to rectify some complication which might well have been avoided had it been anticipated in time These cases were not under my care but were examined and photographed during a consultation visit One photograph (Fig 1) shows an unfortunate child whose life has been spoiled by loss of sight directly due to avitaminosis Many blind children were seen in the same ward as this child at the same time Children suffering from cancrum oris (Fig 2), involving the cheek as well as elsewhere, are invariably in very poor nutritional condition They are usually suffering from multiple nutritional deficiencies Avitaminosis is only one part of malnutrition It is difficult to estimate to exactly what extent each of the factors concerned is responsible for the low state of health The prognosis of cancrum oris cases is poor and there is a death rate of not less than 40 per cent in spite of treatment Such patients as recover frequently have marked disfigurement

Many children get a perforation of the cheek or loss of a large area of tissue about the lips It is very difficult to make a satisfactory plastic repair at a later date which will not be grossly disfiguring, even though it may be possible to close the gap which has resulted from the gangrene Operation should not be undertaken under any circumstances at the early stage Early plastic operation is most unlikely to be successful and the child's poor condition will be jeopardised by the surgical procedure undertaken too early It is essential to wait for up to three months before any plastic operation is considered for the repair of a tissue defect

Gangrene of the skin in any of the three areas mentioned heals slowly It has been noted with interest that patients suffering from vitamin deficiencies are much more liable to leg ulcers than those who do not suffer from avitaminosis



FIG 1



FIG 2

Fig 1—Avitaminosis—measles—blindness
Fig 2—Cancrum oris of cheek in malnutrition case

An interesting account is given of two groups of soldiers in the Sudan area where one group was given milk to supplement their diet, the other group was not given milk It was noticed that those who received milk improved very considerably in general health and the number of ulcers in the milk-drinking group decreased rapidly Those receiving no milk were very slow in improving in spite of local treatment to the ulcers [5]

In a district where there is a marked avitaminosis of vitamin A it is common for the patients to complain that they cannot see well at dusk, they suffer from some degree of night blindness To interrogate patients on this matter is a simple way of detecting avitaminosis of the A type in a district Fain and Falaise,[6] working in the Ruanda-Urundi area of Belgian Congo, note a large number of African male children suffe from vesical calculus The patients are all between the ages of 6 and 11 y The considered to be associated with a deficiency of vitamin A, b should not be affected also,

if the condition is of dietetic origin, is not easy to understand Many of the patients would appear healthy on casual inspection Poor wound healing and disruption is predisposed to by avitaminosis A surgical wound may rupture even though the sutures are still in position Such a catastrophe usually happens when a patient eats food secretly at night, having received it from relatives during the day, and some of the food "goes the wrong way" and convulsive coughing occurs which is uncontrollable by the patient Post operative rupture of abdominal wounds most frequently occurs at night

There are several known vitamins in the B group Surgically speaking, deficiency of any of the B group predisposes to varying degrees of œdema in tissues Manifestations of the beriberi syndrome make patients most unsuitable subjects for surgery Their tissues are waterlogged and they do not heal well Non urgent surgery should be avoided in such cases From personal observations made in Gambia, West Africa, it is noted that the administration of fresh palm wine has a very beneficial effect on the œdema of true beriberi In fluid retention due to other causes it does not seem to have the same beneficial diuretic effect If fresh palm wine does not cause diuresis in an œdematous patient suspected to be suffering from beriberi the diagnosis should be seriously reconsidered Myocarditis is also prevalent in vitamin B deficiency The poor myocardial condition may well predispose to operative collapse during or soon after the operation Post-operative neuritis may also have a vitamin B deficiency background Whereas avitaminosis was not recognised before operation, not being suspected, it may become apparent while the patient is convalescent By reason of his operation he may be unable to take adequate diet during his early convalescence, this predisposes to the appearance of symptoms and signs judged to be of a deficiency type

Allied to the vitamin B deficiency are other nervous conditions manifested by a disturbance of the mental equilibrium post operation With conditions of the pellagra type there is often a very marked mental change in patients A condition of acute or subacute mania may occur following operations Not only is such a mental upset a very serious condition in a patient at any time, but at a time when a patient has sustained a surgical wound, possibly of the abdominal wall, it becomes much more serious The patient not only runs the risk of a prolonged upset but he may rupture his abdominal wound as a result of injudicious activity due to his upset mental state The potential risk of mental upset in subjects with avitaminosis is unlikely to occur to the majority of the junior doctors, but after seeing a few cases it is realised that prevention is better than cure, and attention to the nutritional state becomes a much more significant matter than initially realised The moral is to give as a routine large quantities of vitamins to patients before operation and thus avoid difficulty after operation It may take quite a few years to appreciate this point and so its inclusion here is considered not unworthy of mention in the hope that others may avoid the mistakes of their predecessors with advantage

The modern tendency to use large quantities of antibiotic drugs has an important bearing on avitaminosis In the case of the use of the tetracycline group of antibiotic drugs particularly, there is a marked interference with the intestinal

Many children get a perforation of the cheek or loss of a large area of tissue about the lips It is very difficult to make a satisfactory plastic repair at a later date which will not be grossly disfiguring even though it may be possible to close the gap which has resulted from the gangrene Operation should not be undertaken under any circumstances at the early stage Early plastic operation is most unlikely to be successful and the child s poor condition will be jeopardised by the surgical procedure undertaken too early It is essential to wait for up to three months before any plastic operation is considered for the repair of a tissue defect

Gangrene of the skin in any of the three areas mentioned heals slowly It has been noted with interest that patients suffering from vitamin deficiencies are much more liable to leg ulcers than those who do not suffer from avitaminosis



FIG 1



FIG 2

Fig 1—Avitaminosis—measles—blindness
Fig 2—Cancrum oris of cheek in malnutrition case

An interesting account is given of two groups of soldiers in the Sudan area where one group was given milk to supplement their diet, the other group was not given milk It was noticed that those who received milk improved very considerably in general health and the number of ulcers in the milk drinking group decreased rapidly Those receiving no milk were very slow in improving in spite of local treatment to the ulcers [5]

In a district where there is a marked avitaminosis of vitamin A it is common for the patients to complain that they cannot see well at dusk, they suffer from some degree of night blindness To interrogate patients on this matter is a simple way of detecting avitaminosis of the A type in a district Fain and Falaise [6] working in the Ruanda Urundi area of Belgian Congo note a large number of African male children suffering from vesical calculus The patients are all between the ages of 6 and 11 years The cause is considered to be associated with a deficiency of vitamin A, but why female children should not be affected also,

if the condition is of dietetic origin, is not easy to understand Many of the patients would appear healthy on casual inspection Poor wound healing and disruption is predisposed to by avitaminosis A surgical wound may rupture even though the sutures are still in position Such a catastrophe usually happens when a patient eats food secretly at night, having received it from relatives during the day, and some of the food "goes the wrong way" and convulsive coughing occurs which is uncontrollable by the patient Post operative rupture of abdominal wounds most frequently occurs at night

There are several known vitamins in the B group Surgically speaking, deficiency of any of the B group predisposes to varying degrees of œdema in tissues Manifestations of the beriberi syndrome make patients most unsuitable subjects for surgery Their tissues are waterlogged and they do not heal well Non-urgent surgery should be avoided in such cases From personal observations made in Gambia, West Africa, it is noted that the administration of fresh palm wine has a very beneficial effect on the œdema of true beriberi In fluid retention due to other causes it does not seem to have the same beneficial diuretic effect If fresh palm wine does not cause diuresis in an œdematous patient suspected to be suffering from beriberi the diagnosis should be seriously reconsidered Myocarditis is also prevalent in vitamin B deficiency The poor myocardial condition may well predispose to operative collapse during or soon after the operation Post-operative neuritis may also have a vitamin B deficiency background Whereas avitaminosis was not recognised before operation, not being suspected, it may become apparent while the patient is convalescent By reason of his operation he may be unable to take adequate diet during his early convalescence, *this predisposes to the appearance of symptoms and signs judged to be of a* deficiency type

Allied to the vitamin B deficiency are other nervous conditions manifested by a disturbance of the mental equilibrium post-operation With conditions of the pellagra type there is often a very marked mental change in patients A condition of acute or subacute mania may occur following operations Not only is such a mental upset a very serious condition in a patient at any time, but at a time when a patient has sustained a surgical wound, possibly of the abdominal wall, it becomes much more serious The patient not only runs the risk of a prolonged upset but he may rupture his abdominal wound as a result of injudicious activity due to his upset mental state The potential risk of mental upset in subjects with avitaminosis is unlikely to occur to the majority of the junior doctors, but after seeing a few cases it is realised that prevention is better than cure, and attention to the nutritional state becomes a much more significant matter than initially realised The moral is to give as a routine large quantities of vitamins to patients before operation and thus avoid difficulty after operation It may take quite a few years to appreciate this point and so its inclusion here is considered not unworthy of mention in the hope that others may avoid the mistakes of their predecessors with advantage

The modern tendency to use large quantities of antibiotic drugs has an important bearing on avitaminosis In the case of the use of the tetracycline group of antibiotic drugs particularly, there is a marked interference with the intestinal

bacterial flora These drugs are of great benefit in one respect but they are not without considerable danger Surgery of the colon has been made safer by the use of antibiotic drugs but vitamin B deficiency may become apparent following their use and also the occurrence of intestinal fungoid conditions has markedly increased [7] The bacterial flora of the bowel has in itself an important function to carry out in breaking down some of the foodstuffs from which vitamin B is released or formed Deficiency of vitamin B also predisposes to an unhealthy state of the intestinal tract This jeopardises the chance of successful surgery in some cases It has long been known that in some way sprue is associated with vitamin deficiency *This condition is common in tropical countries, possibly* more so in Asia than in Africa

Vitamin B deficiencies are usually easily detected by the clinical conditions which they give rise to about the mouth The tongue tends to have a cracked and red and rather sore appearance Areas of leucoplakia develop in the more chronic cases *There is* sometimes soreness about the lips and insides of the cheeks In the male, soreness of the scrotum with an eczematous condition may be seen It is likely that with vitamin B deficiency, as with the other vitamin deficiencies, the cause may not necessarily be an absence of the vitamin in the food but rather that the already low supply of vitamin is damaged by excessive cooking of the food The absorption of the vitamin is most important and it is necessary to have a healthy upper intestinal tract to absorb an adequate supply of the vitamin from the food It has been noted that conditions which would appear to be due to a lack of vitamin B may clear up quite quickly when a patient is treated for intestinal infections This is particularly the case with ankylostomiasis The conditions apparently due to deficiency of vitamin B clear up in many cases following treatment of hookworm infection without necessarily giving any increase in vitamin B Advanced peripheral neuritis due to deficiency of vitamin B is not often seen, and the possibility if neuritis comes on rather suddenly that the patient has a diphtheritic wound infection or infection of the diphtheritic type from an ulcer must be kept in mind As this is a rare occurrence it is not easily remembered, hence its mention here

Diphtheritic infections may occur in the external genitalia of female patients The most common place for diphtheritic infection to be noted is of course the *upper respiratory tract* Paresis of the soft palate and regurgitation of fluids through the nose suggests a diphtheritic neuritis Diphtheria occurs in periodic outbreaks in Africa and other tropical areas, and must be remembered The death-rate is quite high, as many cases are brought in with laryngeal obstruction and are very urgently ill on admission In pellagra the skin changes are fairly *typical and are noted specially in the hands*, legs and around the neck Pellagra patients have usually rather dry skin with a tendency to increased pigmentation in the scaly areas in the sites mentioned

Some patients who have obviously some degree of pellagra are liable to meteorism, abdominal distension with wind in the bowel An interesting possibility *suggests itself, namely, that in an area where volvulus is very common* there may be an underlying diathesis of vitamin deficiency Volvulus appears to be a condition which is much more common in the tropics than it is in temperate

zones It is also associated with the eating of maize to some extent Maize may have an inhibitory influence on intestinal peristalsis To what extent this vitamin factor is perhaps contributory is difficult to say, but the possibility should be kept in mind There are some districts with a much higher incidence of volvulus than occurs in nearby neighbouring districts Any of the various forms of vitamin deficiencies may be detected when a patient is undergoing a routine examination either for employment or when he is complaining of a condition with no obvious bearing on avitaminosis, such as a hernia It is noted, however, that some patients who appear at a surgical department complaining of a condition of spontaneous hæmorrhage into a joint may well be suffering from a degree of scurvy or vitamin C deficiency, this is particularly the case where a patient shows a hæmarthrosis and no history of injury can be elicited The absence of a history of injury suggests the possibility Many patients will give a history of injury if encouraged to do so, but unless the history of injury is obvious and given spontaneously by the patient it should be accepted with caution Some patients will agree very willingly that an injury did occur if they think that you want them to say that such occurred Other evidence of vitamin C deficiency in such cases should be looked for

A tendency to hæmorrhages in other parts of the body is suggestive Bleeding from the gums occurs quite frequently in vitamin C deficiency Softness of the gums predisposes to loosening of the teeth and dental sepsis Some patients following operation show extensive hæmorrhages in the tissues far beyond that which might reasonably be expected in a healthy patient Such patients may well be suffering from some degree of vitamin C deficiency if they do not have any evidence of hæmophilia In patients with dark skin it is not so easy to see cutaneous hæmorrhages as in those of the lighter complexion A tourniquet test is none the less worth doing, it is easy to do and not very time-consuming Hæmorrhages may not be immediately apparent, but sometimes following the application of a sphygmomanometer band and raising the pressure to above 200 mm, petechial hæmorrhages may be seen two or three days later

Some babies develop cephalhæmatoma some days after birth and this is associated with a low vitamin C content in the mother during her late pregnancy The use of vitamins during pregnancy is highly desirable Not only do they save complications in the mother but also in the child Vitamin C decreases the liability to intracranial hæmorrhage as well as extracranial hæmorrhage, as seen in cephalhæmatoma It may also help to decrease the risk of hæmorrhage from the umbilicus Vitamin C seems to be one of the factors associated with the complex process of blood clotting The injection substance known as Kapolin seems to have some relation to vitamin C and is used in the same circumstances Vitamin C also seems to be necessary for the satisfactory healing of wounds and the formation of healthy elastic tissue Striæ gravidarum on the abdomen of pregnant women are much more common in areas where vitamin C is deficient The administration of vitamin C markedly decreases the formation of striæ gravidarum if given during pregnancy Striæ are thought to be due to unhealthy elastic tissue giving way under the stretching effect of the developing pregnancy It has been suggested that the administration of large quantities of vitamin C

helps to prevent keloid formation in communities where keloids are common Having observed patients, however, with this in view no advantage has been noted following the administration of large doses of vitamin C, though some advantage may occur The administration of vitamin C and calcium is *beneficial before* gall bladder operation where there is marked predisposition to post-operative hæmorrhage There is some relationship between the metabolism of iron and vitamin C in formation of hæmoglobin It is an advantage to give patients suffering from anæmia a high content of iron and vitamin C Lassance, Peeters and Grailet,[8] noting the urinary output of vitamin C in patients in the Gety area of Congo, detected a seasonal avitaminosis C which was very marked in the dry season, fresh vegetation being at its lowest *at that time The important* observations of Carr [9] are significant relative to avitaminosis C He found on analysis of the dried pith of the fruit of the baobab tree (cream of tartar tree—botanically named *Adansonia digitata* L.) that it contained a high content of vitamin C His findings indicate that samples analysed showed from 175 mg *per 150 gm to 445 mg per 100 gm Half an ounce of the powdered pith taken* daily is sufficient and an adequate ration of vitamin C Baobab trees are a common *feature of the landscape all over the tropics The association between vitamin D* and calcium metabolism has long been recognised

More important conditions related to the metabolism of vitamin D in the tropics are subacute development of osteomalacia in women of child bearing age, especially during the latter months of pregnancy The woman may have had a normal delivery during her previous pregnancy, but in the latter months of her present pregnancy she may develop marked pain about her pelvis, especially in *the areas of the hip joints and lower lumbar region , such a patient may be brought* in in great distress and obviously in a serious condition That she should develop symptoms of this type late in her pregnancy is probably due to the increased requirement of calcium by the fœtus when fœtal bone formation is active, and this in a woman advanced in pregnancy and in poor general condition is sufficient to precipitate the extensive changes noted, virtually a subacute rickets in an adult

In many of the women who develop osteomalacia it would appear to come on following low *grade illness which has confined the patient* to bed and as a result she is suffering from a degree of lack of sunshine Inadequate synthesis of vitamin D as a result of lack of sunshine at a time when there is an increased demand on her calcium, to supply the needs of her child, precipitates the ultimate breakdown The pelvis assumes a triradiate shape as a result of weight bearing on the lateral aspect of the pelvis in the areas of the hip joints, and these areas as a result of softening are approximated towards the midline Osteomalacia almost invariably *gives rise* to a complete obstetrical obstruction necessitating Cæsarean section for delivery of the child Advanced bone changes and alteration in the shape of the pelvis may be confirmed by X ray if apparatus is available, but are easy to detect on physical examination

Rickets occurs in children in the tropics also, and is more common than previously thought From personal experience of several rickets cases it is found that the history of some chronic illness can almost in all cases be elicited , this is probably the predisposing factor in the development of rickets The child

having been deprived of sunshine for many months and possibly some years shows signs of the condition The cause of the rickets is due to a low vitamin D content in the diet and a lack of exposure to the sun as the result of a chronic illness which confines the child to his house To help to remove the fallacy that rickets does not occur in the tropics, Mr Lovett-Campbell[10] published an interesting account of a boy with rickets from Northern Nigeria giving photographs of a typical rachitic subject

Non-union in fractures would appear to be less common in the tropics than in temperate zones It would appear that healthy expatriates from northern countries who sustain accidents in the tropics are much more liable to non-union than they might reasonably be expected to be in a temperate zone Non union of fractures appears to be very rare in indigenous people and less frequently seen than one might expect The essential lesson learnt from experience is that all patients about to undergo non-urgent operations should be given a good supply of mixed vitamins before operation for not less than four weeks prior to hospitalisation Avitaminosis does not appear to predispose to renal calculus in the tropics, primary renal calculus being extremely rare in indigenous African patients Elsewhere it may occur more commonly

PROTEINS IN SERUM

In order to have good, healthy, firm tissues it is necessary to have a proper balance of all blood constituents The correct relationship between all constituents, salts and protein in solution must constantly be maintained at fixed levels The necessary balances are maintained by the intake and output of the individual substances concerned, absorption for each must be adequate and excretion of each must be maintained at a correct blood level Interference with the necessary intake or output of each seriously maladjusts this balance which is essential to health The normal level of total protein in blood serum is approximately 7 gm per 100 c c of blood, 7 per cent solution The albumin, which is the bigger factor, is 4 gm per 100 c c of blood, and globulin, which is the smaller factor, 3 gm per 100 c c of blood, the total being 7 gm per 100 c c of blood

It is important to be able to appreciate a deficiency of total protein as exhibited by the patient's clinical condition A very healthy patient has good thick serum with the normal protein content The blood sedimentation rate depends on the amount of protein in the serum If the total protein level is normal, approximating 7 gm per 100 c c, the rate of fall of the cells is slow, 2 to 5 mm in first hour—Westergreen's method If, however, the protein is depleted and the blood is much more watery, the red cells settle more quickly and the result is a high blood sedimentation rate The test merely indicates a low blood protein The interpretation of the test has caused much controversy, but putting it shortly it may be said that a patient's general condition is poor if the sedimentation rate of the blood is high A high sedimentation is associated with any condition where there is a breakdown of tissue, such as in active tuberculosis and in malignant disease The sedimentation rate is usually raised during pregnancy In the

puerperium the sedimentation rate is quite high while there is an involuting process going on in the uterus after delivery

The sedimentation rate test is quite useful in surgical cases, in country stations, where there are very limited laboratory facilities and much work to do, a very simple test can be undertaken at the bedside, which has the same implications approximately as the sedimentation test This was described by Bolan,[11] in America He was actually attempting to find a suitable test for malignant disease This test is approximately a sedimentation method but done with an undiluted drop of blood on a glass slide in the form of a thick film A good thick drop of healthy blood is spread on a glass slide as a control, nothing is added, it is made into a thick film form of about 2 cm evenly distributed and is allowed to dry in the air The result is of great interest A similar blood drop preparation is made from the patient whose condition is under consideration After the bloods have dried they are examined and compared The control blood slide from a presumably healthy patient shows that the blood dries in a uniform pattern throughout the preparation On the other hand, in the case of the patient who is presumed to have malignant disease it will be found that the blood dries irregularly with clumps of red cells adhering together and leaving between them clear channels In a patient with malignant disease or low protein for any other reason, the final appearance of the dried blood is very suggestive of the appearance of incompatible blood when two incompatible bloods are being cross-matched before anticipated blood transfusion The exact mechanism of the test may be very complicated and it is not completely understood, but whatever the explanation is, it is useful in clinical practice in detecting patients with a low serum protein This test will be referred to again in greater detail under the section on malignant disease and an illustration given (Fig 285)—as drawn for the original article

Patients suffering from nutritional œdema are essentially those who have a renal lesion, whether this be inflammatory or degenerative, of the more chronic type Normally, organised protein should not be lost through the kidney circulation Protein enters the urine only if the renal tubules are damaged

The normal disorganised end-products of protein metabolism are urea-like substances The instructions given to students to test the urine at least once before all operations was a very sound one, considering the albumin test on urine is a simple one No patient should be deprived of the advantage of having this simple but important examination done before operation is undertaken Considering first the intake of protein it is common knowledge that the amount of protein food taken by various communities varies greatly Protein intake tends to be very low in the low wage-earning communities Patients in a much higher wage-earning group tend to take a much higher protein diet Meat is a relatively expensive form of food all the world over Nutritional œdema is therefore much more common in patients whose economic circumstances are low Such patients whose protein intake is low cannot afford to lose protein without showing obvious clinical signs of protein deficiency at an early stage They may be living at a level close to protein starvation Nutritional œdema of children is common throughout the tropical world the climatic conditions of many

of the tropical countries are not favourable for dairy farming for many reasons

Milk drinking is a habit to those living in temperate climates where milk is easily obtained It is a very health giving habit if the milk is free from disease In most tropical areas people refuse milk even if it is offered to them, they have not been used to taking milk as part of their normal diet This is a great disadvantage to the maintenance of normal protein requirements Most children suffering from kwashiorkor disease, or nutritional deficiency of protein, essentially suffer from a lack of protein when they are weaned If the mother of the child becomes pregnant again when this child is only a few months old she frequently weans this child, for her milk supply fails to a considerable extent The child is therefore deprived of breast milk and protein contained in it Other contributory factors in kwashiorkor disease also contribute to the degenerative kidney process, with the resultant interference with the excretion of chlorides The increased blood chloride and decreased protein in the circulation predispose to the characteristic œdema The unhealthy skin, the loss of hair, and degeneration of pigmentation are all characteristic of the condition

When a small child is deprived of breast milk it is compelled to take to other diet, the indiscriminate ingestion of any food available and lack of care in preparation and cleanliness predisposes to worm infection with ascariasis The danger of ascaris infestation at an early age is due in part to the fact that ascariasis predisposes to the interference with the absorption of protein, and the child already deprived of breast milk and the supply of protein contained in that source is further weakened by the loss of absorption of protein from other sources of food This fact has been substantiated by interesting experimental work in India [10]

A degree of avitaminosis induced by deprivation of breast milk may also be a factor in the production of kwashiorkor disease The prognosis in kwashiorkor disease once the condition is established even with treatment is poor, and about 30 per cent of the children suffering from the condition die If in addition to their poor general state a surgical operation is inflicted upon them the prognosis is very poor indeed An operation of any sort should be avoided if at all possible

In children suffering from nutritional œdema the wounds do not heal well, they become easily infected and their ill condition is aggravated by the surgery undertaken To give an increase in the protein and a decrease in the salts and fat in the diet appears to be the basis of treatment The addition of vitamin is also suggested Treatment is suggested in medical textbooks, and considerable detail given regarding the regulation of the dietetics Surgical treatment should be avoided at all costs except in emergencies The prognosis following any operation is grave The character of blood protein pattern seems to be considerably altered by disease

Using the method of paper electrophoresis in diagnosis of chickenpox and smallpox, a characteristic curve representing the constitution of the proteins, as they occur in these two different conditions, shows that a particular pattern is produced by each of the conditions (see Fig 4) The two patterns are

different, but in each condition the pattern remains constant for the disease concerned

Paper electrophoresis can be used as a method of differential diagnosis in several conditions [13] The use of this method might be considerably extended in tropical diseases but it is a laboratory procedure requiring skill and training and special apparatus in order to carry out the test [11] Electrophoresis has also been used in the detection of various forms of hæmoglobin [15] An extract is given as a matter of interest to indicate the way the test is done, though greater detail is necessary to carry out the test, the extract is of interest, however

It would appear on walking through medical wards that nutritional œdema in adults is much more common in male than in female patients It may be that *the greater incidence of liver disease in males predisposes to this, due to the* failure of the liver to synthesise the protein from food into the proper form suitable for human tissue incorporation The majority of patients admitted to surgical wards suffering from chronic œdema are those who have had some septic condition of a chronic nature, possibly a chronic ulcer which has remained untreated for many years Amyloid disease or a chronic degenerative condition of the lower kidney tubules associated with œdema is seldom seen nowadays in temperate climates It used to be seen many years ago most frequently with chronic osteomyelitis Chronic ulcers of the leg are still common in many parts of the tropical world with or without bone involvement The patient's general condition in chronic cases is generally very poor and there may be œdema of the other leg, the abdominal wall, and the scrotum (Fig 3), also, there may be fluid in the peritoneal and other serous cavities as well as puffiness about the face These signs all suggest a chronic kidney condition, in such cases amputation of the leg at the mid-thigh may be the wisest procedure Patients naturally resent such drastic measures, but if the position is tactfully explained to them and the possibility of an artificial limb being obtained for them, they may agree

Before any surgery is undertaken it is desirable in such cases to give a blood transfusion to improve the general condition Such patients are usually suffering from a degree of all the nutritional deficiencies—protein deficiency, salt retention and some degree of avitaminosis and a low hæmoglobin level with fluid retention In spite of removing the source of their infection by amputation, in cases of leg sepsis, they often remain œdematous for several months

A deficiency of any of the factors concerned in nutrition seems to predispose to a considerable extent to a disturbance of the other factors For example, a vitamin B deficiency causes some degree of œdema and an unhealthy state of the intestinal mucous membranes, this in turn interferes with the absorption of protein *Patients with nutritional œdema for any reason are very liable to have* an accumulation of fluid in the serous cavities, they develop ascites easily, and are liable to pleural effusion If there is any tendency to hydrocele it is aggravated Once kidney damage has become chronic it cannot be improved to any great extent *It therefore becomes necessary to regulate the patient's foodstuffs in* compliance with his requirements, and his ability to deal with these substances, and excrete them

At one time it was thought that patients with albumin in the urine should have their protein cut down It was later suggested with some degree of revolutionary boldness that those with albumin in the urine should have the proteins in the diet increased A distinction should be made as to whether the albumin in the urine is due to an acute inflammatory process (nephritis) or a chronic degenerative process (nephrosis) If the albuminuria is due to an active inflammatory process still being present, as in acute nephritis, the protein in the diet should be decreased, if, however, it is due to a chronic condition where the inflammatory process has passed over and the patient is now losing protein due to a damaged kidney, and will continue to do so, his protein must be replaced by an increase of protein in his diet to make up for that which he is losing

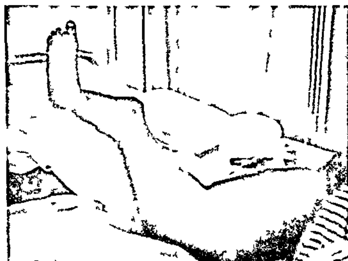


FIG 3

Nephrosis Œdema of left leg Right leg amputated for chronic osteomyelitis

through the defective kidney condition The acuteness or degree of chronicity of the kidney condition can be determined by microscopic examination of the urine In such cases the excretion of salts is below normal and therefore there is retention of chlorides in the body It is desirable under these circumstances to decrease the ingestion of salts with the diet

Nutritional œdema associated with hypoproteinæmia may be improved by dietetic means Great caution is necessary in such cases in the use of mercurial diuretic drugs Some patients have been known to collapse following the use of these drugs Intravenous arsenical drugs are also dangerous in cases of hypoproteinæmia and should be avoided altogether Many of the conditions for which novarsenobenzol was used in the past are now treatable with penicillin This is a much safer procedure, as penicillin does not seem to tax kidney function

A blood transfusion before any form of surgery is a great benefit in these patients, but frequently the benefit is only of a temporary nature as the essential

pathology cannot be altered The quantity of blood given should not exceed 1 pint in a hydræmic patient If the hæmoglobin is low it is an advantage to give a packed cell transfusion It is well known that a patient who is in poor condition may damage his wound easily following operation

Hypoproteinæmia predisposes to deficient hyperplasia and wound rupture is therefore likely to occur if the patient strains or coughs suddenly Sutures in an abdominal wound should be left in longer in a patient in poor condition than in the patient with normal healthy tissues Œdema of the tissues of the intestines is quite marked in such cases, and following gut resections junctions are liable to give way much more easily than in patients who are in a better general state of nutrition With hypoproteinæmia there is diminished bowel activity, there is a greater risk of infection in wounds, and also it is noted that shock may be much more severe in such patients Hypoproteinæmia predisposes to slower union in fractures it is thought, but cases have not been encountered where non-union has resulted from this cause alone

Nutritional œdema patients do not replace their hæmoglobin quickly in spite of tonics and vitamin C being given Blood transfusion improves these patients more quickly than iron tonics If operation is imperative in emergency a transfusion should be given If, as frequently occurs, blood is not available, a substitute may be given with advantage in the form of 5 per cent protein hydrolysate in 5 per cent glucose, dried blood plasma has ceased to be marketed by most of the firms previously supplying it Protein hydrolysate can be purchased from the commercial firms and is useful in urgent cases where blood cannot be obtained for the patient The same conclusion is again noted that it is much better to attempt to adjust the patient s protein balance before undertaking any operation than to operate on a patient in poor condition and then be faced with the difficulty of improving his condition following operation Patients invariably show obvious clinical evidence of deficiencies when their nutritional factors are down to about 50 per cent of the normal level This applies to all the factors in nutrition—fluids, salts, vitamins, proteins and hæmoglobin

Great care should be taken to avoid operation of a non urgent nature in convict prisoners, this unfortunate class of individuals not infrequently suffers from a degree of malnutrition The diet in most prisons is maintained at an adequate but minimal level for the maintenance of health, and many of the persons who are inmates of such institutions enter the prison in a very poor state of nutrition Non-urgent conditions which are not unduly incapacitating should not be operated upon during the term of imprisonment If a non urgent operation is considered desirable in a long-term prisoner, adequate time should be given to improve his nutrition before this is undertaken On medical grounds some consideration may reasonably be given to such cases and a higher diet allowed It is well known that avitaminosis, especially beriberi and pellagra, are not infrequently seen in prison institutions The low average mentality of the inmates of prisons and asylums in itself predisposes to some extent to the occurrence of dietetic deficiencies and hence avitaminosis Patients who are below average intelligence usually do not feed themselves well and are poor by reason of their low wage-earning capacity and therefore cannot get adequate food in many cases

HÆMOGLOBIN CONTENTS

It has been recognised for centuries that a patient who has a pale conjunctival membrane of the eye and pale-coloured mucous membranes, as seen on examining the tongue and gums, is probably suffering from a loss of blood of some sort The cause of the loss of blood may be known or unknown With an external hæmorrhage following an accident the cause of the loss of blood is apparent With a slow but progressive loss of blood, either into the intestinal tract or through the kidneys, the site and nature of the loss is not so obvious Some loss of blood, however, may reasonably be suspected if the mucous membranes are very pale If there is not an active loss of blood apparent from the vascular system at some point, an intravascular breakdown in blood may be the cause, as occurs in the case of some blood diseases, it may also follow the ingestion of certain drugs One patient illustrating this very well was an adolescent pregnant girl who, with a view to producing an abortion, took naphthalene balls by mouth Although there was no external blood loss following, a severe acute hæmolytic anæmia developed due to a breakdown of the blood cells resulting from the substance ingested The patient was extremely ill but fortunately recovered with the help of a blood transfusion Naphthalene poisoning has been reported in England by Newns [16]

In snake-venom poisoning of the viperine type there is a severe hæmolytic process induced with a fall in the hæmoglobin and the patient becomes very pale and extremely ill, and in some cases may die if the blood is not replaced by blood transfusion Snake-bite and its treatment is dealt with elsewhere in this book

With external blood loss with hæmorrhage there is little change in the pattern of the blood cells If the anæmia is due to a blood disease there is usually a marked change in the character of the blood picture, as illustrated by microscopic examination of a blood film In aplastic anæmia, due to failure of the blood-forming system, there is inadequate replacement of blood cells of the various types The condition, if suspected, should be confirmed by examination of the bone marrow as well as examination of the circulating blood, noting the characteristics and relationships of the various types of blood cells

The character of blood in healthy persons remains very constant and comparable Fixed normal levels may be expected if no disease is present The hæmoglobin percentage is the character here being considered There are many methods of estimating the hæmoglobin percentage Any method which is tolerably accurate and simple to carry out is the most suitable for clinical surgical practice If there is a gross defect in the level of the hæmoglobin percentage it is desirable to carry out more complicated tests at the laboratory, which will give more precise information as to the nature of the blood alteration and the associated disease It is difficult to assess accurately by the appearance of the patient the level of his hæmoglobin A patient with pale mucous membranes usually has a low hæmoglobin but not always so Of the two common methods of estimating the hæmoglobin percentage usually used, though there are many more than two available, the Tallqvist method is much simpler than the Sahli method The former is, however, less accurate than the latter, but it has many

advantages The Tallqvist method of putting a drop of blood from the finger on a piece of specially prepared blotting paper and allowing it to spread and then comparing it with a colour scale provided is sufficiently accurate for clinical purposes The specially prepared blotting paper should be used, not *any* blotting paper It also has the advantage that it tends to err on the low side Whereas the Sahli scale is more accurate it is slightly more difficult to carry out, and if the Sahli method is adopted as a routine method, it will be found that a much smaller number of patients will be examined for their hæmoglobin percentage It is much better to examine a large number of patients with moderate accuracy than to examine a very small number of patients with considerable accuracy neglecting the others

In order to use the Tallqvist scale it is necessary to have an accurate visual acuity for colour vision, an ability to see red properly (and this must not be misunderstood) should be noted It is wise to make a practice of having two nurses to read the result of a Tallqvist scale estimation The difference of the reading given by the two nurses is often considerable on the same hæmoglobin test Colour blindness is noted most frequently in reference to the colour red A small number of persons are quite unable to use a Tallqvist scale for this reason From practical experience over many years it has been concluded that the Sahli scale reads much higher than the Tallqvist scale on any individual patient The discrepancy is greater at the lower hæmoglobin levels The discrepancy decreases as the hæmoglobin reaches 100 per cent where the two scales appear to be the same

Tallqvist scale	35 per cent,	Sahli scale	50 per cent	Difference	15 per cent
Tallqvist scale	48 per cent,	Sahli scale	60 per cent	Difference	12 per cent
Tallqvist scale	61 per cent,	Sahli scale	70 per cent	Difference	9 per cent
Tallqvist scale	74 per cent,	Sahli scale	80 per cent	Difference	6 per cent
Tallqvist scale	87 per cent,	Sahli scale	90 per cent	Difference	3 per cent
Tallqvist scale	100 per cent,	Sahli scale	100 per cent	Scales equal	

If it is remembered that a Tallqvist scale gives a reading of about 15 per cent lower than a Sahli scale in the middle hæmoglobin range it gives a fair estimate to work on The discrepancy decreases as the percentage rises In temperate zones a hæmoglobin of 80 per cent on the Sahli scale is considered to be the "critical level" A patient with a hæmoglobin below this "critical level" is one who is considered to require a blood transfusion before any major surgery is considered permissible In many tropical countries where worm infestation is common and chronic malaria exists in a high proportion of the population it is rare to see a hæmoglobin in the level of 80 per cent It is, however, not practical to get blood for transfusion for all patients whose hæmoglobin is below 80 per cent, and in tropical surgical practice it has been considered over many years to take 50 per cent hæmoglobin on the Tallqvist scale as the "tropical critical level", this level corresponds approximately to 62 per cent on the Sahli scale If it is made a rule not to undertake any non-urgent operation in a patient whose hæmoglobin is below 50 per cent on the Tallqvist scale there will be very little trouble, unless there is a large blood loss at operation

With adequate care in respect to the previous subheadings indicated regarding nutrition, it will be found that after one month's treatment regarding the state of nutrition an increase of up to 30 per cent will be attained in the hæmoglobin level This will bring the patient up to a reasonably safe level, approximately 80 per cent on the Tallqvist scale, which would, of course, be reasonably good Fifty per cent on the Tallqvist scale is the figure to remember Do not operate under this figure in non urgent cases Urgent emergency cases may have to be operated upon at a much lower hæmoglobin level In non urgent cases it is most desirable to wait until the nutritional state of the patient is improved In operations where there is a high risk of hæmorrhage, such as in the case of a massive thyroid adenoma having to be removed, it is unwise to operate unless the Tallqvist shows a reading of 75 per cent —that is to say, somewhat over the 80 per cent level on the Sahli scale The higher the hæmoglobin is, of course, the better 75 per cent Tallqvist being the minimal figure for large thyroid cases

Operations on patients with low hæmoglobin due to serious disease should be avoided whenever possible unless imperative One of the conditions which gives rise to a low hæmoglobin which is common in the tropics is ankylostomiasis The slow but progressive loss of blood can be very grave, and patients with hæmoglobin levels as low as 30 per cent or even 25 per cent Tallqvist are not at all uncommon Loss of blood due to schistosomiasis, where hæmaturia is prominent, is usually not so severe, and it is more usual to find the hæmoglobin in the level of 50 to 60 per cent Tallqvist in these cases Loss of blood from the intestinal tract due to neoplastic conditions is not often noted by the patient unless the growth is low down and advanced Patients with the growth in the right side of the colon become notoriously anæmic due to a slow persistent loss of blood over a long period without any apparent obstructive bowel symptoms The intestinal contents in the right side of the colon tend to be fairly fluid and obstruction tends to occur late, if at all Gastric and high intestinal hæmorrhages usually give rise to more urgent and severe symptoms and are noted in many cases by the patient

Gastric and œsophageal hæmorrhage associated with high portal tension usually gives rise to an urgent episode when the patient is brought to hospital having vomited blood Signs of shock are usually apparent also, as the hæmorrhage is sudden in type In cases of ruptured ectopic pregnancy, where operative treatment is imperative and urgent in spite of the low hæmoglobin level, every care should be exercised to give the patient an autotransfusion as soon as possible, starting it as soon as blood is available on opening the abdomen This subject will be dealt with later in a separate section Suffice to say here that patients who have had an internal hæmorrhage due to a ruptured ectopic pregnancy stand operation surprisingly well under ether and oxygen anæsthesia in spite of the apparently very poor initial condition Ruptured ectopic pregnancy cases should not be given spinal anæsthesia as their hæmoglobin level is very low and the blood-pressure is very low due to shock

In view of the special characteristics of sickle cell anæmia a separate section will be devoted to this subject

advantages The Tallqvist method of putting a drop of blood from the finger on a piece of specially prepared blotting paper and allowing it to spread and then comparing it with a colour scale provided is sufficiently accurate for clinical purposes The specially prepared blotting paper should be used, not *any* blotting paper It also has the advantage that it tends to err on the low side Whereas the Sahli scale is more accurate it is slightly more difficult to carry out, and if the Sahli method is adopted as a routine method, it will be found that a much smaller number of patients will be examined for their hæmoglobin percentage It is much better to examine a large number of patients with moderate accuracy than to examine a very small number of patients with considerable accuracy neglecting the others

In order to use the Tallqvist scale it is necessary to have an accurate visual acuity for colour vision, an ability to see red properly (and this must not be misunderstood) should be noted It is wise to make a practice of having two nurses to read the result of a Tallqvist scale estimation The difference of the reading given by the two nurses is often considerable on the same hæmoglobin test Colour blindness is noted most frequently in reference to the colour red A small number of persons are quite unable to use a Tallqvist scale for this reason From practical experience over many years it has been concluded that the Sahli scale reads much higher than the Tallqvist scale on any individual patient The discrepancy is greater at the lower hæmoglobin levels The discrepancy decreases as the hæmoglobin reaches 100 per cent where the two scales appear to be the same

Tallqvist scale 35 per cent,	Sahli scale 50 per cent	Difference 15 per cent
Tallqvist scale 48 per cent,	Sahli scale 60 per cent	Difference 12 per cent
Tallqvist scale 61 per cent,	Sahli scale 70 per cent	Difference 9 per cent
Tallqvist scale 74 per cent,	Sahli scale 80 per cent	Difference 6 per cent
Tallqvist scale 87 per cent,	Sahli scale 90 per cent	Difference 3 per cent
Tallqvist scale 100 per cent,	Sahli scale 100 per cent	Scales equal

If it is remembered that a Tallqvist scale gives a reading of about 15 per cent lower than a Sahli scale in the middle hæmoglobin range it gives a fair estimate to work on The discrepancy decreases as the percentage rises In temperate zones a hæmoglobin of 80 per cent on the Sahli scale is considered to be the "critical level" A patient with a hæmoglobin below this "critical level" is one who is considered to require a blood transfusion before any major surgery is considered permissible In many tropical countries where worm infestation is common and chronic malaria exists in a high proportion of the population it is rare to see a hæmoglobin in the level of 80 per cent It is, however, not practical to get blood for transfusion for all patients whose hæmoglobin is below 80 per cent, and in tropical surgical practice it has been considered over many years to take 50 per cent hæmoglobin on the Tallqvist scale as the "tropical critical level", this level corresponds approximately to 62 per cent on the Sahli scale If it is made a rule not to undertake any non-urgent operation in a patient whose hæmoglobin is below 50 per cent on the Tallqvist scale there will be very little trouble, unless there is a large blood loss at operation

With adequate care in respect to the previous subheadings indicated regarding nutrition, it will be found that after one month's treatment regarding the state of nutrition an increase of up to 30 per cent will be attained in the hæmoglobin level This will bring the patient up to a reasonably safe level, approximately 80 per cent on the Tallqvist scale, which would, of course, be reasonably good Fifty per cent on the Tallqvist scale is the figure to remember Do not operate under this figure in non urgent cases Urgent emergency cases may have to be operated upon at a much lower hæmoglobin level In non urgent cases it is most desirable to wait until the nutritional state of the patient is improved In operations where there is a high risk of hæmorrhage, such as in the case of a massive thyroid adenoma having to be removed, it is unwise to operate unless the Tallqvist shows a reading of 75 per cent—that is to say, somewhat over the 80 per cent level on the Sahli scale The higher the hæmoglobin is, of course, the better 75 per cent Tallqvist being the minimal figure for large thyroid cases

Operations on patients with low hæmoglobin due to serious disease should be avoided whenever possible unless imperative One of the conditions which gives rise to a low hæmoglobin which is common in the tropics is ankylostomiasis The slow but progressive loss of blood can be very grave, and patients with hæmoglobin levels as low as 30 per cent or even 25 per cent Tallqvist are not at all uncommon Loss of blood due to schistosomiasis, where hæmaturia is prominent, is usually not so severe, and it is more usual to find the hæmoglobin in the level of 50 to 60 per cent Tallqvist in these cases Loss of blood from the intestinal tract due to neoplastic conditions is not often noted by the patient unless the growth is low down and advanced Patients with the growth in the right side of the colon become notoriously anæmic due to a slow persistent loss of blood over a long period without any apparent obstructive bowel symptoms The intestinal contents in the right side of the colon tend to be fairly fluid and obstruction tends to occur late, if at all Gastric and high intestinal hæmorrhages usually give rise to more urgent and severe symptoms and are noted in many cases by the patient

Gastric and œsophageal hæmorrhage associated with high portal tension usually gives rise to an urgent episode when the patient is brought to hospital having vomited blood Signs of shock are usually apparent also, as the hæmorrhage is sudden in type In cases of ruptured ectopic pregnancy, where operative treatment is imperative and urgent in spite of the low hæmoglobin level every care should be exercised to give the patient an autotransfusion as soon as possible, starting it as soon as blood is available on opening the abdomen This subject will be dealt with later in a separate section Suffice to say here that patients who have had an internal hæmorrhage due to a ruptured ectopic pregnancy stand operation surprisingly well under ether and oxygen anæsthesia in spite of the apparently very poor initial condition Ruptured ectopic pregnancy cases should not be given spinal anæsthesia as their hæmoglobin level is very low and the blood pressure is very low due to shock

In view of the special characteristics of sickle cell anæmia a separate section will be devoted to this subject

Where it is considered desirable to rectify the anæmia quickly, intravenous ferrivenin can be used When ferrivenin is given intravenously twice a week the rise of hæmoglobin is about 2 per cent per day When using this substance it is desirable to draw some blood into the syringe to mix with the injection material before the total injection is given If the ferrivenin is not diluted with blood before the injection it may cause thrombosis of the vein The use of iron tablets by mouth, however, is usually adequate, and suitable for most patients Raising the blood hæmoglobin level by blood transfusion is a rapid and efficient method of dealing with anæmia, but in the tropics it is not always easy to get blood for transfusion In the case of hæmolytic anæmia due to viper snake-venom poisoning it is frequently necessary in severe cases to give a blood transfusion This matter will be dealt with in a subsequent section when dealing with bites of animals

Blood transfusion with good healthy blood brings a patient's hæmoglobin level up approximately 10 per cent per pint of blood given Working in West Africa, in 1950, in examining the hæmoglobin level of all patients in surgical wards it was found that in a female surgical ward the average hæmoglobin level on the Tallqvist scale was 55 per cent In the male ward the hæmoglobin level on the same scale was 65 per cent Repeating this form of examination in 1957, seven years later, it was found that the average hæmoglobin percentage in female patients was 65 per cent The average hæmoglobin in female patients had gone up by 10 per cent, whereas the male percentage hæmoglobin level remained approximately the same as it was seven years earlier These simple observations are of importance The reason for the hæmoglobin rise amongst female patients is almost certainly due to the fact that, with increase of maternity services and the free use of iron tonics which are advocated and which are now available in the commercial firms of the large towns, iron is being taken much more freely by women Although iron can be purchased by male patients just as freely, they do not purchase it as they are not necessarily encouraged to do so They have remained at the same hæmoglobin level between 1950 and 1957 Taking iron freely is probably the most important factor If the important factor was the elimination of the other conditions, such as hookworm disease, or malaria, it would probably show as an improvement on the male population just as much as in the case of the female population, but this has not been the case

If patients in the tropics have to be submitted to surgery at a lower hæmoglobin level than they would be in temperate climates, it is *imperative that every effort* be made to conserve blood at operation The importance of this is not sufficiently realised It is difficult to get blood from blood banks as there is frequently no blood in the bank, and it is difficult to get blood from relatives in many cases The three most important factors in conserving blood and preventing blood loss is in free use of a 1 in 200,000 adrenaline solution infiltration into the area of the wound used as a routine procedure at operation This technique has been a common practice in most countries when undertaking thyroid operations, but it is neglected in most other operations It is not taught as a routine in the teaching centres In the tropics it certainly should be undertaken much more frequently in view of the difficulty of replacing blood A supply of 1 in 200,000 adrenaline

solution should be put on the operating table as a routine in view of the necessity of blood conservation The use of a tourniquet in limb surgery should also be insisted upon, quite unnecessary blood loss may occur if this is not done The use of a tourniquet in all operation cases on limbs makes the operation much easier and less time-consuming, and there is less blood loss The use of a 1 in 200,000 solution of adrenaline is of enormous advantage in doing operations above the groin, and especially operations for elephantiasis of the scrotum It *is quite remarkable how the blood loss can be minimised by this means* Another important measure is the correct use of posture during operation To allow a patient's legs to hang down over the sides of the table causes a considerable " pooling " of the blood in the lower limbs, and there is less bleeding from surgical wounds elsewhere at the site of operation The dependent leg position is most useful, especially in cases of elephantiasis of the scrotum

Patients being operated upon for vesicovaginal fistula bleed much less freely in the ventral " jack-knife " position, with the legs in the hanging-down dependent position as opposed to being operated on in the lithotomy position where there is considerably more bleeding If extreme degrees of posture are used to minimise blood loss it is necessary to exercise great care should the pulse become poor The patient's position may have to be brought back to nearer the horizontal position again on the table A slight Trendelenburg position may even in some circumstances be desirable The low hæmoglobin level is seldom due to poor nutrition by itself The use of intravenous hypotensive drugs is not safe in the absence of a second doctor to administer and control them It should be remembered that women during the latter part of pregnancy have a marked degree of anæmia, and caution should be exercised if surgery for some other condition present appears to be indicated, such as following accidents

In examining the hæmoglobin of a large number of pregnant women in a non-tropical area it is surprising to find in the report of Coombe Hospital, Dublin, in 1952, that 30 per cent of the women examined had a hæmoglobin level below 50 per cent, in spite of the absence of tropical diseases Fifty per cent of the women had a hæmoglobin level below 70 per cent, so that one might say that a high proportion of pregnant women suffer a marked degree of anæmia In the tropics a higher proportion than 50 per cent of pregnant women suffer from marked anæmia Be very careful if asked to operate on a pregnant woman for some condition other than her pregnancy By attending to all the factors concerned in the maintenance of health, including requirements for iron in the formation of hæmoglobin, the patient may be brought into much better condition for surgery A low hæmoglobin and resultant deficient oxidation of the tissues predisposes to a marked degree of chronic ill-health, with the early onset of degenerative conditions The points mentioned above are of great surgical importance Those who are particularly interested in hæmatology can consult books written on that subject especially for physicians and laboratory workers Surgeons would be unwise, however, to neglect these books altogether, they should be available for reference

Some repetition has been necessary in indicating the importance of the various factors concerned in the maintenance of nutrition All the factors are

dependent to some extent on each other In view of the seriousness of any operation the doctor should exercise every care to make it as safe as possible for the patient An operation performed may be, to the doctor, part of the day's work, but *to the patient it is an epoch in his life on which all may depend* To keep this in mind helps us to realise that any measure which tends to make an operation safer is worthy of attention, and in this respect attention to the pre-operative nutritional state of the patient is of supreme importance

EXTRACTS

1 *Clinical Biochemistry Normal Chemical Standards* A Cantarow and M Trumper 5th ed 1955 Saunders

WHOLE BLOOD (All values expressed in milligrams per 100 c c unless otherwise stated)

Chloride (as Cl)	270 to 300
(as NaCl)	450 to 500
Glucose (Folin and Wu)	80 to 120
Hæmoglobin (gm per 100 c c)	14 to 16
Iron	*40 to 60*
Non protein nitrogen (blood urea)	25 to 35
Urea nitrogen	9 to 17
Blood volume expressed as c c per kilo	63 to 80

BLOOD PLASMA AND SERUM

Albumin (gm per 100 c c)	3 6 to 4 5
Globulin (gm per 100 c c)	2 1 to 4 2
Amylase (diastase units per 100 c c)	80 to 150
Ascorbic acid	0 6 to 1 5
Bilirubin	0 1 to 1
Calcium	8 5 to 11 5
Chloride (as Cl)	340 to 370
Chloride (as NaCl)	570 to 620
Cholesterol total	140 to 260
Fibrinogen	200 to 400
Hydrogen ion concentration (pH)	*7 35 to 7 45*
Icteric units index	4 to 6
Iron	0 03 to 0 18
Ketone bodies	0 2 to 0 9
Total lipoids	385 to 675
Magnesium	1 7 to 2 8
Acid phosphatase (Bodansky units)	1 5 and over
Alkaline phosphatase (Bodansky units)	1 5 to 4 in adult
Alkaline phosphatase (Bodansky units)	5 to 14 in child
Potassium	14 to 21
Total protein	6 to 8 gm
Sodium	300 to 350
Volume c c per kilo	35 to 40

CEREBROSPINAL FLUID

Chlorides (as Cl)	430 to 460
Chlorides (as NaCl)	720 to 760
Glucose	40 to 70
Protein	15 to 45

2 Fluid Estimation in Dehydrated Cases—Rogers Method *Textbook of Tropical Medicine, 6th ed 1952 p 284* L Rogers and J W Megaw

Blood density estimated by comparison with glycerin solutions of known specific gravity A drop of patient s blood rises or falls depending on specific gravity, when placed in glycerin

solutions of known specific gravity Add a drop of blood gently to each solution with syringe Using ureometer, glycerin solutions are made up of known densities, 1,050 to 1,070 Stock solutions should be made up for use as required, they keep well if corked

RESULTS

State of Blood	Specific Gravity	Fluid Requirements	Prognosis
Well hydrated	1050 to 1058	Adequate	Good
Normal	1058 (normal blood)	Nil extra	Good
Dehydration	1060	1 pint	Fair
Dehydration to increasing extents	1062	2 pints	Serious
	1064	4 pints	Very poor
	1066	6 pints	Moribund

3 "Influence of Salt Intake on Loss of Scalp Hair" E Foldes *Acta med scand* 1957, 159, fasc ii, 147

salt was not restricted

4 "Value of Paper Electrophoresis in Diagnosis of Chickenpox" V N Krishnamurthy *Indian J med Sci*, 1956, 10, 602

Technique

1 Take filter paper moistened with veronal buffer solution pH 8 6
2 Add 0 01 c c of patient's serum, whose diagnosis is under consideration
3 Pass electric current through it, 110 volts with 3 ma for fifteen hours
4 Dry strips at 110° C for ten minutes
5 Stain strips with naphthalene black 112, B 200

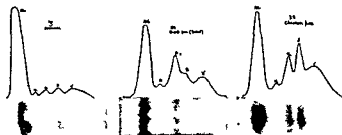


FIG 4
Paper electrophoresis in diagnosis of disease
(*After* Krishnamurthy)

6 Remove stain with acetic acid methanol mixture for four hours, this shows bands representing protein
7 Strips then dried and immersed in transparent fluid of α Bromonaphthalene and liquid paraffin
8 Read in photometer (Fig 4)
9 Result, a graph plotted corresponding to density of protein at various distances from the centre (Fig 4)

The method suggests interesting possibilities for diagnosis of other conditions

REFERENCES

1 ROGERS, L & MEGAW, J W (1952) *Textbook of Tropical Medicine*, 6th ed p 284 London Churchill

2 CANTAROW, A & TRUMPER, M (1955) Clinical biochemistry *Normal Chemical Standards*, 5th ed Philadelphia W B Saunders Co

3 FOLDES, E (1957) Influence of salt intake on loss of scalp hair *Acta med scand* 159, fasc II, 147

4 MANUKIAN, R S (1958) The course of surgical wounds and post-operative complications in avitaminosis C *Khirurgiya*, 2, 51

5 CHARTERS, A D (1947) The etiology of tropical ulcers in Somalis *J trop Med Hyg* 50, 22

6 FAIN, A & FALAISE, A (1957) Calculose vesicale et avitaminose A chez enfants au Ruanda Urundi *Ann Soc belge Méd trop* 1, 135

7 WEINBERG, M H (1956) Risks and dangers of antibiotic therapy *Indian Practit* 9, 667

8 LASSANCE, M, *et al* (1957) Note sur l'existence d'un avitaminose C. *Ann Soc belge Méd trop* 2, 269

9 CARR, W R (1955) Ascorbic acid content of baobab fruit *Nature*, 176, 1273

10 LOVETT-CAMPBELL, A C (1952) Clinical rickets in the tropics *Trans roy Soc trop Med Hyg* 46, 107

11 I [illegible] 63, 316

12 [illegible] *ides* in the [illegible]

13 [illegible] ickenpox *Indian J med Sci* 10, 602

14 KULKARNI, B S (1957) Staining methods separated by paper electrophoresis *Indian J med Sci* 11, 320

15 EDINGTON, G M (1957) The pathology of sickle cell hæmoglobin C and sickle cell anæmia *J clin Path* 10, 182

16 NEWNS, G (1949) Naphthalene poisoning *Lancet*, 2, 964

3

Malaria and Tropical Surgery

SUPERIMPOSED MALARIA

MALARIA probably remains the greatest killing disease in the world, in spite of the vast sums of money spent annually to eradicate it It is likely to remain one of the greatest scourges of mankind for many years still Probably not less than one-sixth of the entire world's population has suffered from malaria at some time The extent of infestation of the disease varies greatly in different geographical areas of the world Practically all tropical areas of Southern Asia and a very large part of Africa and much of South America are hyperendemic locations of this disease Rao,[1] referring to the disease in India, is of the opinion that not less than 100 million persons suffer from the disease annually in India alone The death-rate from malaria in India is in the level of 2 million persons a year and India is only one fraction of the malaria ridden part of the world It is difficult to appreciate fully this enormous death rate Such a loss of life is comparable only to the losses suffered in a global war, yet such a death-rate is not appreciated by most people, and by many others accepted as unavoidable There is an enormous death-rate amongst children in the tropical world as a result of malaria It also kills a large number of adults Added to this loss of life there is a further prenatal loss by reason of abortions, miscarriages and premature births as a result of malaria infections Subtertian malaria appears to cause abortions more frequently than benign tertian malaria Public health measures are much the most important in decreasing the incidence of this disease Interference with mosquito breeding-grounds is of paramount importance in lowering the incidence of this disease Major drainage schemes are extremely expensive to undertake Mosquitoes are not only a public danger but they are a personal nuisance even if not infected with malaria and other diseases The average doctor is not only anxious to help his patients but also to make living conditions tolerable for himself and those around him, as well as make patients in his hospital as comfortable as possible If by any means he can decrease the mosquitoes in the locality close to his hospital he will achieve a success which is much appreciated by all

The clearance of mosquitoes from a hospital area is a comfort to all patients as well as an advantage to the whole community Wilson,[2] working in Eastern N[illegible]

[illegible]

tennis ball These hardened oil preparations of D D T welded together into a mass are a very efficient means of interfering with the breeding of mosquitoes

REFERENCES

1 ROGERS, L & MEGAW, J W (1952) *Textbook of Tropical Medicine*, 6th ed p 284 London Churchill
2 CANTAROW, A & TRUMPER, M (1955) Clinical biochemistry *Normal Chemical Standards*, 5th ed Philadelphia W B Saunders Co
3 FOLDES, E (1957) Influence of salt intake on loss of scalp hair *Acta med scand* 159 fasc ii, 147
4 MANUKIAN, R S (1958) The course of surgical wounds and post operative complications in avitaminosis C *Khirurgiya*, 2, 51
5 CHARTERS, A D (1947) The etiology of tropical ulcers in Somalis *J trop Med Hyg* 50, 22
6 FAIN, A & FALAISE, A (1957) Calculose vesicale et avitaminose A chez enfants au Ruanda-Urundi *Ann Soc belge Méd trop* 1, 135
7 WEINBERG, M H (1956) Risks and dangers of antibiotic therapy *Indian Practit* 9, 667
8 LASSANCE, M, *et al* (1957) Note sur l'existence d un avitaminose C *Ann Soc belge Méd trop* 2, 269
9 CARR, W R (1955) Ascorbic acid content of baobab fruit *Nature*, 176, 1273
10 LOVETT-CAMPBELL, A C (1952) Clinical rickets in the tropics *Trans roy Soc trop Med Hyg* 46, 107
11 BOLAN H (1944) Diagnostic value of blood studies in malignancy *Amer J Surg* 63, 316
12 VENKATACHALAM, P S & PATWARDHAN, V N (1953) The role of *Ascaris lumbricoides* in the nutrition of the host *Trans roy Soc trop Med Hyg* 47, 169
13 KRISHNAMURTHY, V N (1956) Value of paper electrophoresis in diagnosis of chickenpox *Indian J med Sci* 10, 602
14 KULKARNI, B S (1957) Staining methods separated by paper electrophoresis *Indian J med Sci* 11, 320
15 EDINGTON, G M (1957) The pathology of sickle cell hæmoglobin C and sickle cell anæmia *J clin Path* 10, 182
16 NEWNS, G (1949) Naphthalene poisoning *Lancet*, 2, 964.

3

Malaria and Tropical Surgery

SUPERIMPOSED MALARIA

MALARIA probably remains the greatest killing disease in the world, in spite of the vast sums of money spent annually to eradicate it. It is likely to remain one of the greatest scourges of mankind for many years still. Probably not less than one-sixth of the entire world's population has suffered from malaria at some time. The extent of infestation of the disease varies greatly in different geographical areas of the world. Practically all tropical areas of Southern Asia and a very large part of Africa and much of South America are hyperendemic locations of this disease. Rao,[1] referring to the disease in India, is of the opinion that not less than 100 million persons suffer from the disease annually in India alone. The death-rate from malaria in India is in the level of 2 million persons a year and India is only one fraction of the malaria-ridden part of the world. It is difficult to appreciate fully this enormous death-rate. Such a loss of life is comparable only to the losses suffered in a global war, yet such a death-rate is not appreciated by most people, and by many others accepted as unavoidable. There is an enormous death-rate amongst children in the tropical world as a result of malaria. It also kills a large number of adults. Added to this loss of life there is a further prenatal loss by reason of abortions, miscarriages and premature births as a result of malaria infections. Subtertian malaria appears to cause abortions more frequently than benign tertian malaria. Public health measures are much the most [illegible] they are a personal nuisance even if not infected with malaria and other diseases. The average doctor is not only anxious to help his patients but also to make living conditions tolerable for himself and those around him, as well as make patients in his hospital as comfortable as possible. If by any means he can decrease the mosquitoes in the locality close to his hospital he will achieve a success which is much appreciated by all.

The clearance of mosquitoes from a hospital area is a comfort to all patients as well as an advantage to the whole community. Wilson,[2] working in Eastern Nigeria, suggested a [illegible] tennis ball. These hardened oil preparations of D D T welded together into a mass are a very efficient means of interfering with the breeding of mosquitoes

in a swampy area By disintegrating slowly in water, they give off a constant small amount of oily material which oils the water and kill larvæ by the toxicity of the D D T They also have a great advantage in that they can be thrown like tennis balls into areas of swampy ground which is very difficult to reach otherwise The materials required are inexpensive and usually available, certainly in most large towns An extract of the article is appended which is of considerable interest and value and may be helpful in supplying details of the method

There has been much argument about the advisability of using nets in hospitals for indigenous patients, or having the whole ward screened to keep mosquitoes out, or whether both or either of these methods should be abandoned in favour of giving prophylactic antimalarial drugs Mosquito nets are expensive and easily damaged Many local patients do not like using nets except in the rainy season when there is a very high mosquito-rate Mosquito-screening of windows and doors has many disadvantages The mosquito door of a hospital ward is usually opened about two hundred and forty times in twenty-four hours, if it is not left open for many hours at a time Lights inside wards tend to attract flies and mosquitoes after dark These enter readily when the door is opened at intervals Having worked in hospitals with wards on ground level and later in a hospital several storeys high, it is quite obvious that hospitals several storeys high have smaller numbers of mosquitoes than those with all wards at ground level—the higher the fewer High hospitals have a considerable advantage in this respect

Some doctors lay much stress on all patients having blood films taken on admission to hospital to find if malaria parasites are present Others err in the opposite extreme in taking no blood films on any patient admitted to hospital, and work on the assumption that all patients have parasites , and whether parasites are found or not found, the conclusion is the same that they should be treated as though they had parasites causing some degree of malaria, even though subclinical The time factor in the examination of blood films for malaria undoubtedly markedly influences the result, as has been found from personal experience It is not practical expending one hour per film looking for malaria parasites, but it may frequently take about one hour before one parasite is found An interesting investigation was undertaken by Colbourne [3] in West Africa, who on examining a hundred thick films for a prolonged time from a hundred patients with no apparent clinical evidence of malaria, found that 7 per cent of the total contained gametocytes On further examination of 1,000 thick films in a similar manner, that is, ten thick films taken from each patient at the same time, it was found that 20 per cent of the total patients examined contained gametocytes In this time-consuming experiment, gametocytes only were looked for, as giving a better indication of chronic malaria without clinical symptoms necessarily being present It would appear most sensible to take it that patients about to undergo surgical operations in a malaria-ridden district have parasites present in small numbers even though they may not at the time show any clinical evidence of malaria Blood films, however, should be taken and examined in all cases where the diagnosis is in question, and where the condition complained of might be malaria rather than the non-malarial condition which brought the patient to hospital

with a view to operative treatment The presence of chronic malaria in a district seems to have the effect of decreasing the incidence of parasyphilitic manifestations of luetic infection Locomotor ataxia is rare in malarial districts, though it occasionally occurs General paralysis of the insane is very infrequently seen

It would appear that it takes a very large number of parasites, possibly up to a hundred per cubic millimetre, before they can be detected easily in a thin blood film The thick blood slide examination is more efficient By this method a larger volume of blood can be examined in the same number of fields The difficulty of finding malaria parasites in the blood, when the number is small, is considerable Van den Berghe[4] carried out an interesting experiment He found that a higher rate of filarial parasites could be detected if, instead of taking blood from a finger, a scarification of the scapular area skin was made and serum expressed by pinching the area to encourage serum to come out, the expressed serum containing some blood cells was stained and examined for parasites It appears to be a good method of finding malaria parasites, as well as filaria, when the numbers in the peripheral blood is small It is a method worth trying in surgical cases where superadded malarial infection is considered to be a factor complicating the surgical sequence of events The lower parts of the body seem to have the highest filarial rate in serum examined from scarified areas, it is worth seeing if such is the case also in malaria

Malaria may be a factor predisposing to termination of pregnancy at all stages If a pregnant woman is brought into a surgery requiring treatment for some condition other than her pregnancy, such as a leg injury, it is advisable to give her some antimalarial drug to decrease the risk of her losing her pregnancy under the stress of her present misadventure

Taking it that all surgical cases are infected with malaria in the tropics to some extent, it is wise to treat them accordingly It has been noted that in a high proportion of post partum maternity cases the blood lost contains malaria parasites, blood from about 20 per cent of cases being positive In 1 per cent of cases the fœtal placental blood contains malaria parasites It would appear that without doubt malaria can be transmitted by transplacental infection if the mother has suffered from malaria during her pregnancy With transplacental infection in mind, it should be remembered that neonatal infants sent to surgical departments for treatment of congenital defects such as spina bifida and exomphalos are very liable, following operation, to develop malaria about one week after operation These children die suddenly, usually during the night, at a time when they appeared to be making satisfactory progress Following a period of normal temperature and a clean wound they develop a sudden high temperature of 102° F and die The blood in these cases almost invariably shows malaria parasites It is noted also that the catastrophe has happened at a time which is less than the time of incubation of malaria contracted as a result of the bite of an infected mosquito Presumably the infection is of congenital origin Antimalarial drugs are necessary if surgery is undertaken in neonatal infants It is very hard to convince the distressed mother that the operation was satisfactory if, in fact, the baby died one week after it was performed Adequate care was not taken in the management of the case, such an event

should have been anticipated and guarded against A very small dose appropriate to the infant's weight must be given to these infants to prevent them developing malaria following operation

CONDITIONS SIMULATED BY MALARIA

Malaria may simulate appendicitis Whereas patients who have upper abdominal pain going to the right iliac fossa associated with some temperature, a marked increase in pulse-rate and muscular guarding in the right iliac fossa are usually suffering from appendicitis, if there is some element in the case suggesting an unusual feature, malaria should be looked for If the patient has been ill for only six or eight hours, and has a temperature of 104° F and symptoms suggestive of appendicitis, it is certainly wise to look for malaria parasites in view of the height of the temperature and shortness of the history Many such cases have been noted over the years, and where the temperature is high and the blood shows many malaria parasites present, it is much wiser not to embark on appendicectomy immediately but to wait a few more hours with a view to finding *if the temperature does not drop suddenly with the corresponding lowering of the* pulse-rate Having operated on a few such cases myself and finding a normal appendix, subsequent cases of a similar character were regarded with much greater reserve, and what appeared at first to be like an acute appendicitis turned out very soon to be subtertian malaria, with rapid improvement on antimalarial treatment and no subsequent attacks in any way suggestive of appendicitis It is permissible to wait up to twenty-four hours in any such case, if doubt exists, as the appendix is most unlikely to rupture under twenty-four hours You are still within the reasonably safe limit, and by waiting this time an operation may well be avoided with advantage to all parties The high temperature coming on *rather suddenly, in spite of the symptoms suggestive of appendicitis, points to* malaria rather than an abdominal inflammatory condition *per se* Appendicitis does not usually have a temperature above 101° F in the first twenty four hours, it may have this later if complications develop, but not at the early stage If the temperature is over 101° F in the first twenty-four hours, malaria parasites should certainly be looked for Undertaking an abdominal operation suspecting a deep-seated inflammation and finding none, but subsequently many parasites in the blood, predisposes to an embarrassing situation and is not without danger *to the patient who may be most uncomfortable for two or three* days due to acute malaria plus an abdominal wound

Several other conditions which patients complain of, requesting treatment at a surgical unit, may be caused by malaria unknown to them Patients sometimes come to surgical clinics complaining of lumbago of several days' or some weeks' duration, the condition being of a low-grade chronic type These patients say that they have no fever and that they have been taking their paludrine regularly and never had malaria In a surprisingly high number of these cases, malaria parasites are present in the blood, and the condition clears up very rapidly with *administration of mepacrine It is of interest* to notice that in true lumbago cases the pain is induced by the patient going slightly forward,

he gets sudden severe pain and abruptly jerks back to the upright position If, however, he has pain in the back due to malaria, the reverse is the case, he holds himself rather rigid and bends forward slightly If he tries to straighten his body, coming up he gets a sudden very severe pain deep in the back, and again goes slightly forward This is the reverse of lumbago This does not seem to have been pointed out in the literature but certainly seems to be the case it is a very important point, differentiating between the two conditions The two are superficially rather similar, they may all be classed as "lumbago" of a type The two conditions are, in fact, the complete reverse of each other Lumbago cannot go down, malaria cannot come up Some apparently gynæcological discomforts may also be due to malaria, this must be kept in mind Various forms of left-sided abdominal pain, especially in the upper part of the abdomen, are due to abnormality of the spleen, as perisplenitis associated with heavy malarial infections Only in a small proportion of cases is the removal of the spleen, for an enlargement due to malaria, considered advisable It may in some cases have to be done, especially if there is a large spleen with a tendency to torsion

Confusion at times arises in differentiating between a sickle cell crisis and malaria, they both give rise to extensive muscular pain, marked headache and some fever, and are in many respects very like each other If the blood is examined for both malaria parasites and sickle cells and the age of the patient is kept in mind, it is usually possible to come to a correct conclusion The patient's blood, however, may contain sickle cells and malaria parasites The peculiar relationship between sickle cell disease and malaria will be dealt with in a later section, as it is of considerable surgical importance Any form of low-grade gastro-intestinal disturbance may be encountered in chronic malaria The severe forms of enteritis associated with malaria are most often seen in young infants The blood in these cases is invariably very heavily infected with malaria parasites There is often a marked degree of dehydration and the child is extremely ill Such cases, however, are very responsive to treatment The cerebral symptoms associated with malaria are not often confused with surgical conditions Most of the cerebral conditions requiring surgical treatment give rise to symptoms of a slower onset than is generally seen in cerebral malaria cases or malaria of the less urgent forms Chronic headaches are sometimes referred to a surgical department considering that disease of a maxillary antrum may be present, it is very seldom difficult to differentiate those of malarial origin, as they have other symptoms suggestive of malaria, pain in the back and pain down the back of the legs Cases which are a little suggestive of intercostal myalgia and pleurisy may also be of malarial origin, these possibilities must be considered It has already been pointed out in the previous chapter that the patient's general health is most important He should be given preliminary treatment for his general health Regard should be taken also of malaria before any operative treatment is undertaken During the four weeks' pre-operative treatment an antimalarial drug should be given as a routine In some cases, however, short notice only is possible before operation In the case of urgent conditions or patients coming from long distances, who have no place to stay if not admitted, it is necessary to take the patient into hospital at the first visit

PRE-OPERATIVE AND POST-OPERATIVE PROTECTION

In some patients, following operation, an unaccountable temperature may occur when there is no apparent infection in the surgical wound Such patients should have their blood examined *for malaria parasites It is often, in these cases,* not possible to detect any evidence of malaria in the peripheral blood, but if an antimalarial drug is not given the patient may continue to run an irregular temperature In the absence of a positive blood finding for malaria, in such circumstances it is justifiable to give antimalarial treatment It is remarkable how frequently, if this is done, such cases settle down immediately With the temperature settling down progressively within twenty-four to forty-eight hours *there is a strong presumption that the condition causing the temperature was of* malarial origin, in view of the effectiveness of the treatment

The gravity of some operations necessitates blood transfusions being given If fresh blood is given in the form of a transfusion in a malarious district it is almost certain that malaria will be transmitted with the blood introduced into the patient Malaria parasites are not killed off by storage of blood at refrigerator temperature Malaria transmission is a constant danger in transfusions It is *possible that the slightly different strain of malaria which may be introduced into* the patient transfused will some days later produce an attack of malaria It is rare to see any measures undertaken to counteract this occurrence Such a possibility is obvious and should certainly be anticipated The risk is evident, and it is recommended that in all such cases the recipient of blood should be given a course of antimalarial therapy This seems a reasonable and proper procedure and a measure which should be taken in all such cases

Neonatal infants are not infrequently sent to surgical departments for treatment of cephalhæmatoma This condition is usually associated with a low vitamin C content in the mother and some interference with the mechanism of blood clotting in the infant The use of Kapolin injections may be of some value and are recommended, but if this drug is not available in small and remote stations it is helpful to give the infant an intramuscular injection of the mother's blood, 3 c c this seems to help in preventing further accumulation of blood after aspiration *Here, again, the risk of introducing malaria parasites from* the mother to the infant must be appreciated and an antimalarial drug should be given to the baby in appropriate small doses following this form of treatment

The necessity of examining the peripheral blood in some cases with sudden abdominal pain where malaria is considered as a possible ætiological factor has already been commented upon

A large number of drugs are available for the treatment of malaria The *treatment of malaria with quinine* is fast becoming obsolete In some areas quinine is still used, not necessarily by choice but by compulsion, because of the absence of any other drug being available Quinine gained its world-wide reputation by reason of its undoubted efficiency, but its use was not without danger There was no comparable rival until the introduction of the synthetic drugs like mepacrine Looking back on the " quinine days " brings some points to notice which are worthy of consideration Large doses of quinine taken for

acute illness, judged to be malaria, predispose to black-water fever The death-rate from this condition was high The risk of precipitating this condition was much reduced if the patient was put on alkaline mixtures for eight hours before starting the quinine Young children are still frequently admitted to hospital with dark wine coloured urine In most of these cases a history can be elicited that a dose of quinine was given, but not in all Some of the older generation still adhere rigidly to quinine, they have more faith in it than in the newer drugs Patients with methæmoglobinuria should be considered seriously ill The condition usually clears up, however, in a few days Patients with this condition should be given alkaline drinks freely by mouth The risk on taking quinine in large doses is sufficient to condemn the drug Only in special circumstances should it be used, if at all The original atebrin of Bayer, Germany, and subsequently mepacrine of Boots, England, and quinacrine, Imperial Chemical Industries, England, have firmly established themselves by reason of their undoubted efficiency There are minimal complications associated with their use when carefully administered

During the transition stage between the quinine days and the mepacrine days opportunity was afforded for comparing treatment by the two methods Quinine produced marked tinnitus in many patients, this was uncomfortable though not very serious Following the use of quinine, continuous mild sweating and tremor was induced in susceptible persons Quinine when taken in the morning by surgeons caused a marked increase in sweating in the theatre during operations undertaken during the next few hours This was quite a serious disadvantage to doctors Other antimalarial prophylactic drugs were more suitable in the circumstances The most serious risk of taking quinine was the precipitation of black-water fever This most commonly occurred where the drug was started suddenly after a lapse of time during which it had been abandoned

During a short investigation on a hundred cases of malaria in Bathurst, Gambia, West Africa, it was found in 1935 that 96 per cent of the cases were considered to be subtertian malaria, as judged by the blood examinations of films 3 per cent were benign tertian and 1 per cent quartan malaria Some of the patients had a double infection with subtertian parasites In a few instances three parasites could be found in the individual red cells The subtertian type of malaria seems to be much the most common type in West Africa Atebrin and mepacrine are very effective drugs in the treatment of subtertian malaria It would appear, however, that they are much less effective in the treatment of *benign tertian infections Reports from Egypt, where benign tertian is the* predominant type of malaria, seem to indicate that mepacrine is less effective in the treatment of benign tertian infections than in subtertian infections It is probably for this reason that adverse reports were received from East Africa where it was reported that there was great danger of psychosis following the use of mepacrine Probably it was found that larger doses were necessary to control benign tertian malaria with mepacrine than subtertian infections, and with the higher dosage mental symptoms were more frequently precipitated Having seen several cases of malarial psychosis when mepacrine was first introduced, some of these cases, bordering on acute mania, were most alarming The

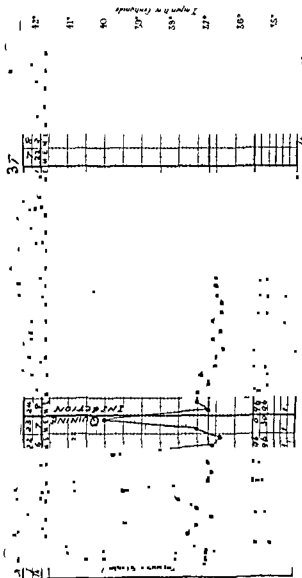


FIG 5

Hospital chart of patient with benign tertian malaria
(Mepacrine treatment ineffective Quinine injection rapid response)

seriousness of this complication must be appreciated The lack of efficiency in treatment of benign tertian malaria with mepacrine was conspicuous in several cases treated in army personnel Little benefit seemed to have been derived from mepacrine even after four days of treatment In view of this failure the patients were put on intramuscular quinine injections with immediate benefit A copy of a chart of a patient so treated is given to illustrate this view (Fig 5) Mepacrine is certainly very efficient in the treatment of subtertian malaria but not efficient in the treatment of benign tertian infections An insufficient number of quartan malarial infections have been seen to express an opinion on the efficiency of various drugs in the treatment of such infections

Paludrine is a drug which is made up in small tablets which are easy to take It has a not unpleasant taste The drug seems to be efficient in killing off the sporozoites received into the circulation at the time of the mosquito-bite If the prophylactic use of the drug is stopped for even a short time and sporozoites enter the hepatic system, the subsequent schizonts in the red cells are very little affected by paludrine It is quite common to find patients coming to the Out patient Department who say that they are taking paludrine regularly—one tablet daily—but who have malaria parasites in the peripheral blood Paludrine is not considered to be an efficient drug for pre-operative use in patients anticipating an operation or in treating developed malaria

Patients who are examined in the Out-patient Department and put on a preliminary course of dietetic treatment, and given a course of mepacrine before operation is undertaken, are not likely to have any trouble with malaria just before or soon after their operation Toxic symptoms are not usual with short courses of mepacrine It is usual to prescribe one tablet three times a day for four or five days only, this is sufficient and is most unlikely to upset the patient Toxic symptoms occur only in those who take excessive doses or those who take the drug continuously over a long period of time and suffer from the cumulative effect The toxic symptoms of mepacrine [5] are loss of appetite, nausea, gastro-intestinal upsets of various sorts, yellow skin staining, slate-grey discoloration of the nail beds and mucous membranes in the mouth—about the gums especially There may be dermatitis in some instances A sense of mental depression or excitement also occurs Insomnia is not unusual Mepacrine taken over a long time may give rise to a degree of aplastic anæmia Mepacrine is a very efficient antimalarial drug in the treatment of subtertian malaria It is suitable for pre-operative medication in areas where subtertian malaria is prevalent

It frequently happens that a patient arrives at hospital not having had any antimalarial drug recently and operation arranged for soon after admission Such cases sometimes develop a sudden high temperature two or three days before operation is anticipated, there is a loss of appetite and headache as well as fever His blood may contain malaria parasites in small numbers If the patient is otherwise not too ill it may be suitable to give him the "one-day" treatment of camoquin for malaria This procedure has been found most suitable and without toxicity It is quick and efficient and with it all parasites disappear from the peripheral blood within thirty hours, and the patient's blood remains clear for at least six weeks by this method On an analysis of cases undertaken by

Ansare[6] the most suitable adult dose has been found to be 0 6 gm, given either as a single dose or in three divided doses of 0 2 gm tablets three times in the same day Blood clearance of parasites is satisfactory in all forms of malaria

Camoquin, a Parke, Davis preparation, is a suitable drug for pre-operative medication as a prophylactic against malaria and as treatment for an acute attack It is most useful where it has not been possible to give the patient a course of treatment before coming into hospital It saves time and beds by its quick efficient action and lack of toxicity No complications of any sort have been noted with its use on any occasion *It is desirable to give all surgical patients* some form of antimalarial treatment before operation This cuts down complications considerably and adds very much to the comfort of patients during convalescence Following operation, patients like taking a tonic of some sort The advisability of recommending a short course of mepacrine at intervals of three or four months following operation is a good one

In the case of patients admitted to a surgical ward with the possibility of an early liver abscess of amœbic origin, Resochin, of Bayer's, Leverkusen, Germany, is a suitable drug to use with a view to treating the extra colonic amœbic condition as well as the possible malaria also present in the patient To use a drug which is beneficial to both conditions has obvious advantages Most antimalarial drugs should be accompanied by alkalis by mouth as there is a slight tendency to cause mild gastric symptoms in some patients Alkaline mixtures are of advantage to patients on low diet who have some tendency towards acidosis

The use of mepacrine as an intramuscular injection should be condemned altogether in all but unconscious patients where it may be the only method of giving this drug, as in the case of patients with cerebral malaria The number of "*mepacrine abscess*" *cases sent to surgical departments makes it obvious* that it is an irritant drug If it is given injudiciously into the buttock and some of the injection material leaks back into the fatty tissue, an abscess will almost certainly form Such an abscess, even when adequately evacuated, is slow in healing and may cause incapacity and much pain unnecessarily On the few occasions when it was personally found necessary to give intramuscular mepacrine the injection given in the subscapular position gave rise to no trouble and minimal pain when this injection site was used Most cases so treated were given the injection when unconscious with cerebral malaria This site seems an excellent one, there is no fat there to go wrong and an overlying scapula distributes the pressure evenly on the area if the patient lies on the back in bed The rule to be adopted regarding mepacrine as well as most other drugs is, "Give medicine by the mouth if there is nothing wrong with the swallowing mechanism and the patient *is not vomiting*" *Treatment by injection* is a much-abused form of therapy and should be stopped unless it is specially indicated or the only available means of getting medicine into the patient in special circumstances The above remarks apply to many drugs but are here mentioned in view of the frequent and unnecessary injection of mepacrine with the formation of abscesses A high proportion of mepacrine abscesses encountered have been in young nurses

Following operation the character of a patient's temperature chart gives a very good indication of the progress of the case If a wound is infected the

temperature usually shows a gradual rise by about one degree a day Some irregularity may be noted but the general trend is slowly upwards If an attack of malaria occurs during a patient's convalescence following operation the temperature often rises abruptly It is a good working rule to suspect malaria as the cause of the pyrexia if there is a sudden rise of more than 2° (Fahrenheit scale) Such a rise is usually followed by a fall of temperature, but to a lesser amount than the rise with a resultant mounting temperature of an intermittent type unless treated by antimalarial drugs In only about 25 per cent of the cases, at this early stage, will malarial parasites be found in the blood The sudden onset of the pyrexia and the accompanying headache or feeling of indisposition are strongly suggestive of the condition being malarial Inspection of the wound for possible sepsis should be undertaken in all such cases The absence of apparent sepsis and a rapid response to antimalarial drugs seem sufficient to justify a conclusion of malaria being the cause of the post-operative upset even in the absence of malarial parasites being found in the blood Any major operation is sufficient to cause a marked circulatory disturbance throughout the vascular system It is not unnatural to expect a rise in the blood parasite rate following operation if no antimalarial measures are taken to prevent it Any form of exertion in a person with chronic malaria is liable to precipitate an acute attack of the condition Exertion fatigue is a well-known predisposing element in inducing an attack The strain of any major operation is surely not less of an exertion to the system than a five-mile walk

Malaria must be constantly reckoned with as a factor jeopardising surgery in the tropics, and it is wiser to forestall the trouble than to lament its occurrence in those who have not been given pre-operative treatment to prevent this complication Taking it that malaria is always present, it is reasonable always to treat it in anticipation rather than of necessity when the patient is convalescent To have any form of post-operative complication or setback is most alarming to the patient and disconcerting to the doctor Anticipation is a very valuable asset

EXTRACTS

"Combating Onchocerciasis with Little Expense C Wilson *W Afr med J* 1956, 5, 162

Poisoning of Simulium breeding streams with balls of D D T, diesel oil and sawdust thrown into streams and marshy sodden stream beds The balls are thrown like hand grenades and left to dissolve slowly They can reach places where it is difficult to set up oil drip tins Optimum mixture found after experiment to be one part of D D T added to nine parts of diesel oil Of this mixture 2 oz are added to sawdust to make up a solid paste ball

The method is useful also for mosquito breeding grounds The oil and the D D T are given off slowly as the ball disintegrates

REFERENCES

1 RAO, K B (1952) Malaria complicating pregnancy *J Obstet Gynaec India*, 2 209
2 WILSON, C (1956) Combating onchocerciasis with little expense *W Afr med J* 5, 162
3 COLBOURNE, M (1956) The effect of prolonged examination of blood films on the parasite rate *W Afr med J* 5, 26
4 Easier and more accurate diagnosis of malaria , 411
5 oning *Trans roy Soc trop Med Hyg* 45, 275
6 ...SARE, M I (1952) Single dose of camoquin in treatment of malaria *Indian J med Sci* 6, 306

using sodium metabisulphite Williams and Mackey,[1] working in East Africa, described this very practical test for precipitating the sickling of susceptible cells by adding a chemical substance, which is a strong reducing agent Sodium *metabisulphite (2 per cent) is added to the drop of blood being examined and* the preparation sealed off This solution must be made up freshly, as required, as it takes up oxygen quickly from the air and so deteriorates rapidly for the purpose of doing the test In order to prevent the solution deteriorating it has been suggested that the fluid might be covered with liquid paraffin and drawn into a syringe from beneath the oil as required In actual practice this does not work well, as has been found from personal experience It is much better to make up the solution in small quantities from the dried powder when it is required Metabisulphite (0 1 gm) should be weighed and kept in rubber-stoppered glass tubes *By adding 5 c c of distilled water to 0 1 g of metabisulphite* a 2 per cent solution is prepared which is suitable for the test The solution should be used on the day it is prepared it deteriorates rapidly and after twenty-four hours it is useless To place 0 1 gm of metabisulphite in tubes and have these tubes stoppered and kept in readiness is much the best method It would be very useful if some of the commercial firms would prepare a supply of tablets (0 1 gm) of this substance Testing for sickle cells is often neglected because the necessary material is not very readily available It is difficult in a small station, with many patients to attend, to go away and prepare this solution at the time it is required while many other out-patients seeking attention remain waiting To have a supply of weighed tablets available would make the rapid performance of the test very easy It would then be necessary only to put a tablet in a 5 c c syringe and draw up distilled water to 5 c c

The sickle cell abnormality seems to be associated with the hæmoglobin factor in blood In describing the two factors in sickle cell disease as (1) the sickle cell trait and (2) sickle cell anæmia, it can be best appreciated by saying that the condition is a hereditary transmissible entity with a gene being derived from each of the parents Describing a patient who is not a sickle cell subject and having a non-sickling gene derived from both parents as "A," then he becomes an "AA" genotype—sickle cell disease being absent in his case If the sickle cell abnormality is termed "S" and the patient under consideration has one "A" gene from one parent and one "S" gene from the other parent he becomes the "AS" type If a patient derives one gene of the "S" type from the mother and one gene of *the "S" from the father he becomes an "SS" type* The "AS" type is said to show the "sickle cell trait" whereas the "SS" type shows "sickle cell anæmia"—this latter type is much more serious Those who have the sickle cell trait may appear reasonably healthy and live to old age, but in early life they have recurrent attacks of sickle cell crises, with characteristic symptoms and a marked hæmolytic disturbance periodically Those persons with blood of the "SS" type are in a serious condition Such patients often die in early childhood A very high proportion of such patients die before the age of 20 The "S" gene abnormal character is only one of many which have been described Hæmoglobin "C" and hæmoglobin "G" have also been described and will be referred to again later

PREVALENCE OF CONDITION

Edington,[4] analysing cases of hæmoglobin "S" and "C," found that in South Ghana the hæmoglobin "S" character occurred in 18 per cent of the population in the "AS" form as a sickle cell trait, and that hæmoglobin "S" occurred as the "SS" type in population to the extent of 1 per cent, that is, true sickle cell anæmia Combinations of hæmoglobin "C" and "G" were also found, but in smaller percentages Those patients with hæmoglobin "SS" disease or pure sickle cell anæmia have a poor prognosis It is the patients of the "AS" genotype—that is to say, those with a sickle cell trait, with recurrent sickle cell crises, occurring in episodal attacks—that one is most concerned with in surgical work Patients with hæmoglobin "C" of the types "AC" and "CC" genotypes appear to live to old age This form of sickle cell abnormality does not appear to cut life short It is thus less serious than the "AS" or "SS" types Even with the low figure for the percentage of sickle cell anæmia "SS" type there is probably not less than half a million cases of true sickle cell anæmia in West Africa alone The sickle [illegible]
persons in West Africa alone [illegible]
Sahara with a total populatio [illegible]
approximate but indicate, for estimation purposes, the enormous importance of this disease relative to surgery Every effort must be made to guard against the risks involved in dealing with such patients Before dealing with the clinical manifestations of the condition, doctors working elsewhere than in West Africa will naturally wish to know how much stress they should lay on this potential danger, and the likelihood of them coming across such cases With this in view, the literature from various parts of the world has been consulted, so that they may note from a review of the literature of widely different areas what risk there is to those not working in West Africa but elsewhere

Abbott,[5] working in the Southern Sudan, examined 100 patients admitted to hospital for conditions other than sickle cell disease, with a view to ascertaining what proportion of these persons showed sickle cells in the blood He made the interesting observation that 18 per cent of these patients showed the sickle cell trait This figure is the same as was found in South Ghana It was of considerable importance to note also that he observed, as has been noted elsewhere, that the high proportion of patients with septic conditions was associated with the sickle cell trait in blood Abbott found that 50 per cent of tropical ulcer cases showed the sickle cell trait Working in Lourenço Marques, Portuguese East Africa, Foy, Kondi, Rebello, and Martins [6] found that the sickle cell trait percentage varied enormously in the different parts of the country It ranged from 1 to 40 per cent, the higher percentages being found in the northern parts of the country, sickle cell anæmia occurring in 1 per cent of the population It was thought that some Indian and Greek patients may have had sickle cell traits also, but on further consideration the possibility of thalassæmia was considered This is a condition bearing a considerable resemblance to sickle cell disease and is found more in the Mediterranean area Harris and Lomax,[7] in Ghana, found a case of thalassæmia giving rise to blood dyscrasias The

erythrocytes had pointed projections There is a decreased fragility of the cells and red cells of minute form present The possibility that such a case may have occurred in an African with mixed Levantine blood was considered, as thalassæmia tends to occur more in the Mediterranean area Thalassæmia (hæmoglobin " E " disease) has recently been described by Chatterjea [8] from Bengal in India as well as from Burma It may bear a relation to Cooley's anæmia If sickle cell disease affected Africans and those of African origin only, the disease would be of no concern to those working in other parts of the world other than where African patients are encountered It is of considerable interest to note that a case of Mediterranean anæmia, Cooley's anæmia—otherwise so termed—bearing a close relationship to sickle cell disease, was noted by Chi-Hsiong Liu [9] and others in Canton, South China It has been noted for several years that some cases simulating sickle cell disease have occurred in the Kwantung area of West China Some Chinese persons in America were found to have a similar condition, and on going into the history carefully it was found that their predecessors had come from the Kwantung area of China From India a case of sickle cell anæmia was reported by Shukla and Parande,[10] and their observation was of great importance, even though only a single case was noted The condition may be much more common in that area of the world than is suspected Naturally, however, if it is not suspected it is not likely to be found Da Silva,[11] investigating the sickle cell trait in several of the states of U S A , found that the incidence of the sickle cell trait in coloured people amounted to 7 7 per cent The incidence is likely to be considerably higher in the Caribbean area One of the risks of major importance, surgically speaking, of this group of diseases is the danger involved in anæsthesia Having personally seen a number of deaths which occurred about twenty hours after the completion of an operation and which were subsequently proved on post-mortem examination to be due to sickle cell crises, the gravity of this condition was appreciated Much greater care was subsequently taken to guard against these mishaps The possibility of such unexplained deaths being due to the sickle cell group of diseases in places other than Africa might be given consideration with advantage It has been suggested that there may be some relationship between sickle cell disease and subtertian malaria, the former giving some form of protection against the latter This conclusion may have been arrived at from the fact that it has been noted that in children dying from cerebral malaria it is of extreme rarity to find that such children have sickle cells present in the blood The theoretical arguments for the conclusions arrived at are ingenious but with a less critical mind it seems difficult to understand why Nature should inflict such an incapacitating disease, with quite a high overall death-rate from it, to give protection against malaria An effort has also been made to associate some form of protection with the presence of hæmoglobin " C " disease So far no firm relationship has been established The method of paper electrophoresis has been used by Edington and Laing [4] in the detection of the various forms of hæmoglobin A characteristic band is given on the pattern produced depending on the variety of hæmoglobin present

CONSTITUTIONAL DISTURBANCES

Sickle cell disease gives rise to a vast number of clinical disturbances It is not always easy to say which of the patient's symptoms are due to sickle cell disturbances or some other condition present Two conditions are frequently present at the same time, this is a difficulty encountered with many patients in the tropics, a multiplicity of maladies giving a complicated picture The symptoms produced by sickle cell disease ultimately amount to those produced by vascular obstruction in the capillary fields in various parts of the body Saunders,[12] writing on the manifestations of sickle cell disease as seen in general practice in West Africa, gives a very simple and accurate description of this condition as found in out patients He describes it as manifesting itself by "recurrent rheumatism and jaundice," the term "rheumatism" being used to describe the limb and joint pains—which are two of the most characteristic features of the condition Following an acute attack of this "rheumatic like manifestation" the patient shows, some days later, a marked degree of anæmia and some yellow staining of the conjunctiva Such an appearance is very characteristic and is due, of course, to a hæmolytic crisis, with a lowering of the hæmoglobin level and a resultant tingling of the conjunctiva with released hæmoglobin The hæmoglobin deposited becomes oxidised and gives rise to the appearance of mild jaundice It may be of interest to those not having seen the condition to realise the fall in hæmoglobin level as estimated daily from the day of admission to hospital of a patient with a sickle cell crisis The initial estimation of hæmoglobin given on a Tallqvist scale was 65 per cent The hæmoglobin level dropped by 5 per cent per day down to 40 per cent in five days It is useful to remember from a practical point of view that the hæmoglobin fall, while the patient is having symptoms and n [illegible] day, the equivalent of h[illegible] several days, depending [illegible] days, this would account for a drop in the hæmoglobin level from 70 to 35 per cent, depending on the duration of the attack The final state of the patient may thus be very low after such an attack

Those who have the misfortune of opening the abdomen in error, thinking that the patient is suffering from an acute abdominal catastrophe necessitating surgery, and subsequently finding that the condition is due to a sickle cell crisis of the abdominal type, will have noted that the peritoneal cavity in these cases usually contains a little fluid which is remarkably yellow stained, looking like bile-stained urine White gauze swabs dipped in this fluid and examined by daylight look quite yellow, almost lemon-yellow Whereas it is not difficult to test the blood for sickle cells and get a result within fifteen to twenty minutes, it has been found useful on occasions, possibly when laboratory assistance was not easily available, to aspirate a small quantity of intra-abdominal fluid with the patient in the "knee hand" position, kneeling on the bed and aspirating with a syringe and needle through an area close to the umbilicus About 1 c c of fluid can usually be aspirated quite easily If this is of yellowish colour, like bile-stained urine, it is almost certain that the patient is having a sickle cell crisis,

such a form of examination is easy to do, and may be most useful Sickle cell crises occur much the most commonly in children and young adults They become much less common over the age of 20 but are seen up to the age of 30, it is rare to see them over the age of 30 It would be reasonable to say that in West Africa in the first ten years of life they are very common, in the second ten years of life they are moderately common, in the third ten years of life they are uncommon, but are seen from time to time after the age of 30 they are definitely very rare The cessation of the attacks is invariably associated with the fibrosis of the spleen due to repeated infarcts

In the larger hospitals, where the work is divided into medical and surgical cases, the instance of sickle cell crisis in surgical wards appears to be much the most common in the second ten years of life—not because it is more common in this age group, but because young patients in the low age group do not explain their symptoms very well and tend to be sent to medical wards much more frequently Such cases are treated as medical patients, and rightly so Cases are only admitted to the surgical ward because of some surgical condition being suspected Patients are admitted from time to time suspected of suffering from osteomyelitis of the long bone of the leg, but on examination it is not difficult to note that the condition affects both legs, though it may be more marked on one side A patient may well say that one part is particularly painful, sometimes about the knee, and if sickle cell disease is not kept in mind a serious error may be made In female patients the conjunctival sac not infrequently assumes a slightly yellowish tinge during the week before the menstrual period is due, but this clears up during the menstrual period, and remains the normal colour during the next two or three weeks If a patient suffers from sickle cell disease and develops a discoloration about the eye, the yellowness does not clear up so quickly Repeated mild attacks of jaundice at irregular intervals in young Africans is strongly suggestive of the presence of sickle cell disease It might be thought that in view of the breakdown of hæmoglobin one might reasonably expect the presence of gall-stones in patients suffering from sickle cell disease, but this does not appear to be the case One young African patient aged 10 years, for whom a gall-bladder was removed because of many gall-stones being present, was found not to be suffering from sickle cell disease as had been suspected Sickle cell disease, *per se*, does not appear to give rise to gall-stones

Patients with cholecystitis with gall-stones have been operated upon on many occasions, none of the patients examined was found to have sickle cell disease

It was mentioned earlier that the lowering of oxygen tension in the blood-drop preparation predisposes to sickling of the red cells in patients suffering from this trait It is interesting to note that in any form of lowering of the oxygen tension there is a predisposition to the sickling of the red cells Smith and Conley[13] carried out valuable experiments relative to sickle cell disease Patients suffering from the sickle cell trait were exposed to lower oxygen tension by travelling in non-pressurised aircraft, and it was found that in many cases hæmoglobinuria was immediately precipitated and a sickle cell crisis occurred in several instances The risks to patients with sickle cell disease travelling in

non pressurised aircraft is considerable. Few commercial aircraft, however, are now used without being pressurised. Adjustment is invariably made for the altered atmospheric conditions under which the aircraft is flying. From actual experience it would appear that the operation risk to a patient with sickle cell disease is increased by not less than 10 per cent. for any operation carried out. Such an increased risk in the operative mortality due to this condition is very serious. It was noted many years ago that there was an abnormally high death rate in young people suffering from septic conditions who were operated upon under general anæsthesia. The matter became so urgent that personal investigations were carried out. The findings were that a high proportion of these cases with septic conditions had sickle cell disease—approximately 60 per cent. It was considered whether the sepsis precipitated sickling of the cells or whether sickling of the cell was predisposing to the sepsis—the latter is considered to be the case. Following a few unfortunate instances of this kind it was decided that all young African patients about to undergo operation under the age of 20 years should have their blood examined for sickle cells. The risk of a sickle cell crisis was greatly aggravated by the administration of a general anæsthetic, especially if for any reason the oxygen tension of the patient's blood was lowered by difficulty encountered with the anæsthetic. Anoxæmia associated with poor anæsthesia is a great risk in sickle cell disease in patients undergoing surgical operation. The administration of oxygen to all patients having general anæsthesia lowers this risk very considerably, and should be carried out in all cases in areas of the world where the condition is common. If a patient has sickle cell disease of any form, it is desirable to give a spinal anæsthetic in preference to a general anæsthetic if the spinal anæsthetic is equally efficient as a general anæsthetic for the purpose for which it is required. Local anæsthesia [illegible] advisedly be considered in some cases. Post-operative death due to sickle [illegible] disease is found to be associated with marked congestion of the internal organs— liver, spleen, and kidneys. Complete blocking of kidney tubules with sickle [illegible] and resultant anuria may occur. A high carbon dioxide blood content [illegible] oxygen content are the two most important factors in producing sickle [illegible] in patients undergoing general anæsthesia—in fact a bad anæsthetic [illegible] patient. Some patients have died apparently due to the precipitation of a sickle cell crisis even though the anæsthetic was not apparently inefficiently [illegible] high proportion of infants with "SS" sickle cell disease (sickle cell [illegible] before adult life is reached and are therefore removed from the population [illegible] of the cases seen in the surgical departments are those who have [illegible] sickle cell crises—the "AS" type. Another serious loss of life is that [illegible] to sickle cell disease in young pregnant women. It has wrongly [illegible] that a woman suffering from sickle cell disease can never [illegible] pregnancy. Many pregnant female patients with sickle cell trait deliver normally [illegible] event, many of them have several children. The extensive obs[illegible] experience of Dr Ofori Atta[11] confirms this. Many deaths, however, do [illegible] pregnant women, usually with the first delivery, the fatality occurring most [illegible] day after delivery, to the surprise and distress of both the family and the [illegible] concerned. It is a wise move, if possible, in obstetrical practice in tropical [illegible] to [illegible]

maternity cases tested for sickle cell disease on the first pregnancy Any patient found to have the sickle cell trait should be treated with great caution certainly if any operative interference is necessary for delivery of the baby Full oxygen should be given with any anæsthetic administered Spinal and local anæsthetics are both worth consideration in such cases if not otherwise contraindicated

ABDOMINAL CRISIS CASE HISTORY

As there is very little written on the surgical aspects of sickle cell disease it is considered that to describe some cases, actually seen and dealt with, may be much more helpful and practical as indicating the magnitude of the problem than to give a long list of symptoms which might be expected, an abdominal sickle cell crisis can easily be confused with ruptured ectopic pregnancy It must be remembered, none the less, that a patient known to have sickle cell disease may also develop a ruptured ectopic pregnancy Such a case occurred in a female member of the hospital staff This patient was known to be off duty frequently as a result of sickle cell crises—possibly for a week or two in every five or six months for this reason She had two children alive, aged 2 and 5 years She was now aged 24 herself In spite of the history being known that she suffered from sickle cell disease, the presence of a fluid thrill in the abdomen, with lower abdominal pain, and a history of a missed menstrual period, seemed to be sufficient to justify operation It was found on so doing that ruptured ectopic pregnancy was present She was treated for this and made an uneventful recovery Another female patient, the wife of a male nurse at hospital, was admitted in a collapsed state She was aged 21 years One menstrual period had been missed, with marked pallor, slight distension of the abdomen, and abdominal pain There was marked sweating and thirst It was considered that she was probably suffering from a ruptured ectopic pregnancy She had generalised body pains Early operation was undertaken and she was found, on opening the abdomen, to have no evidence of ruptured ectopic pregnancy at all The possibility of a sickle cell crisis had been considered, but in view of the missed period it was thought that a ruptured ectopic pregnancy was the more likely diagnosis Her blood was not examined for sickle cells before operation, she was admitted during the night This serious error having been made, an opportunity was afforded to see exactly what was the state of the abdominal organs in a case of sickle cell abdominal crisis, which had been considered a possible cause of her symptoms It was noted that the peritoneal cavity contained a small amount of highly stained serous fluid of a yellow colour It was of interest to note that the distension of the abdomen was due to dilatation of the small intestine and not the large intestine The large intestine was small and contracted With sickle crises where there is abdominal distension it is always the small intestine which is distended One photograph of a distended abdomen in a small boy who suffered from this condition is shown to illustrate the appearance (Fig 7) The patient recovered without operation To open the abdomen and see exactly what has happened and have the conclusion forced upon you that a sickle cell crisis is the cause of the condition, is an unfortunate state of affairs One week later an adult male patient was admitted

with a distended abdomen, marked anæmia and abdominal pain In view of our earlier misfortune his blood was examined immediately and he was found to have a large number of sickle cells present In spite of his age of about 36 years, which is rather older than is usual in sickle cell crises, he was treated conservatively and got better quite quickly Most abdominal crises last from five to ten days, it is exceptional for them to go on for longer than this time In exceptional cases they may go on as long as fourteen days

A further mistaken diagnosis of intestinal obstruction is also informative regarding sickle cell disease On opening a grossly distended abdomen in a male patient (A K) aged 15 years no obvious cause for the obstruction was found



FIG 7
Sickle cell abdominal crisis

It was noted, however, that the fluid in the abdomen, which was of small amount, was yellow stained There had been retention of urine and 20 oz of urine was removed by catheter, this was a very large amount of urine in a patient of this age The distension of bowel was involving the small intestine only, the large intestine was not involved at all On seeing the bile-stained appearance of the fluid in the peritoneal cavity and noting the distension of the small intestine and not the large intestine, the possibility of sickle cell abdominal crisis was considered The patient died the next day Post-mortem sections were examined by a pathologist who submitted the following report "Stomach, no abnormality detected, liver, grossly congested The liver cell columns are separated by sickled red blood cells, the vessels below show hypertrophy of the media Kidney congested, markedly so, with sickle cells Glomeruli packed with R B C's Spinal cord not received for examination Request for examination of the spinal cord had been requested but the specimen was not transmitted for

examination at the laboratory" Opinion "In view of the histology and the clinical symptoms I think this might well be a case of sickle cell crisis Wintrop reports such a similar case which resembled poliomyelitis"

A sickle cell crisis is usually associated with a severe headache, marked sweating and a high temperature, pain in the back and limbs The patient may be in a very distressed state, being restless and turning from side to side, unable to attain comfort in any position A severe headache in an apparently abdominal case usually suggests a generalised rather than a local cause of the abdominal symptoms In African patients malaria and sickle cell conditions should be considered Pain in the back is also very usual The attack in fact is very like one of malaria The suddenness is often remarkable One very instructive case occurred which caused much confusion The details are here given which illustrate the difficulties which may arise A request was received from a senior colleague for a consultation in a medical ward because a young patient aged 16 years was considered likely to be suffering from a gastric perforation This boy gave a history that while he was running to catch a train he got a fright that he would miss the train, but having caught the train he felt "suddenly quite queer" sitting in the carriage, with a severe pain round his chest There was marked breathlessness and palpitation, he took it that this was due to running for the train, but it did not settle down as he expected it to do The pains soon became generalised and he had very marked abdominal discomfort He was sent to hospital in a very distressed state the next day Seeing the patient twenty-four hours after the attack started, he was transferred to a surgical ward He had marked upper abdominal pain and board like rigidity of the abdominal wall, quite like a gastric perforation case He was also noted to have active movements of the ala nasi about the nose and a fast respiration rate, suggestive of some chest condition He had also rigid back muscles about his lumbar area His facial appearance did not suggest that he was suffering from a gastric perforation of twenty four hours' duration and it was considered very doubtful as to the advisability of opening the abdomen The very rigid condition of the spinal muscles was suggestive of tetanus, but the patient had no obvious evidence of a recent or comparatively recent wound anywhere, nor did his muscles appear to go into tetanic spasms, they were tense all the time The patient looked rather alarmed, and the remote possibility of the case being one of hydrophobia was considered No history of dog-bite could be elicited however Operative measures were considered unwise The next day the pain about the back descended to the area of the buttocks and around the pelvis, and the patient complained of weakness of the legs The possibility of poliomyelitis being the cause was then considered, but thought to be unlikely The weakness of the legs was, however, rather alarming The muscles were very painful, the weakness was more in the right leg than the left leg He was unable to lift the right leg off the bed, though he could lift the left leg with difficulty The blood examined on the first day in the medical ward for malaria parasites contained none as far as could be seen It was not specifically examined for sickle cells at that time The hæmoglobin was 65 per cent on admission After forty-eight hours the blood was again examined, this time with a view to ascertaining whether

sickle cells were present or not These were found to be present in abundance A daily hæmoglobin estimation was done and showed a progressive drop during the next seven days After one week the symptoms improved markedly and the legs recovered strength The pain in the back decreased and the patient was obviously starting to recover An irregular pyrexia (Fig 8) persisted during the first six days, thereafter improvement was noted Following the initial attack the patient became slightly jaundiced about his conjunctiva, and the case looked much more like one of sickle cell disease at this stage than initially when it was not suspected It was, however, fortunate that the abdomen was not opened

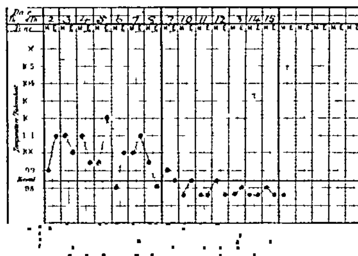


Fig 8
Sickle cell crisis patient's chart

The case had many points which were initially very like a gastric or duodenal perforation, but not being typical it was considered unjustifiable to operate on the patient As soon as sickle cell disease was suspected—that is, after forty eight hours from the time he was first seen—a history was elicited that previous but less severe attacks had been encountered The character which brought the whole diagnosis to light was that the patient was noted to have many unusual scars about both legs (Fig 9), and on questioning the patient about these scars it was found they had been caused by native medicine applied intermittently for pain in the legs, which was associated with fever There is little doubt that the real cause of the pains in the limbs was sickle cell crises In areas where sickle cell disease exists the possibility must be constantly kept in mind in view of the wide range of conditions which it may simulate, such as ectopic pregnancy, osteomyelitis, gastric perforation poliomyelitis and intestinal obstruction

Regarding the frequency of sickle cell crises another case illustrates this point A schoolgirl aged 16 was admitted to the surgical wards and remained as an in patient for several months because of stiffness of joints Being an

intelligent girl she was requested to give a complete history in writing of all the details, as far as she could remember, concerning her illness She stated that she had had the disease from early childhood, her first attack being at the age of about 3 years—her earliest recollection The pains were first noted in the arms and the legs For some years she appeared to have no attacks, but in the year 1950, at the age of 9 years, she had an attack of pain all over the body She had similar attacks subsequently at frequent intervals about every two to four months The pains were worse at night and less by day She was now, at the age of 16,



FIG 9
Leg scars due to local applications for bone pains

getting attacks about every three to six weeks, much more frequently than previously, with pains in the bones, the onset being sudden The stiffness of the joints came on following severe attacks The joints involved corresponded to the position where the attacks were most severe The joints concerned were the left elbow, the right wrist, and the right knee Other joints were also involved to a slight but much lesser extent The bone changes associated with sickle cell attacks usually involve many bones The X-ray appearances are sometimes suggestive of osteomyelitis at several sites Peculiar borehole-like channels of rarefaction appear to be somewhat characteristic The number of bones involved suggests a generalised condition rather than a single localised lesion An X-ray photograph of such a case is submitted to illustrate this appearance in a small girl (Fig 10) The patient was aged about 6 years The vascular obstruction associated with sickle cell disease affecting bones predisposes to osteomyelitis and not infrequently a patient showing characteristic bone changes also develops osteomyelitis, as in this case at one site—third finger

It is considered worth reporting this large number of errors in diagnosis covering several years of surgical practice in an honest effort to enlighten others

so that similar mistakes may be avoided These few cases reviewed are only a very small proportion of the many cases submitted for surgery, which subsequently were found to be patients suffering from sickle cell disease and not operated upon

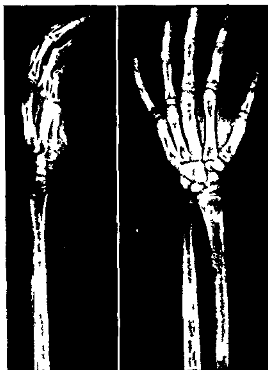


FIG 10
Bone changes in child with sickle cell disease

Sickle cell crises frequently cause mistakes in diagnosis It is an obvious advantage to let others have the benefit of information gained as a result of the errors of their predecessors No ill can come of reporting one's errors much ill can come from failure to reveal them Hence it is hoped that these admissions of failure may help to prevent the same errors in those who carry on surgical work *in the tropics where sickle cell disease is encountered*

PRFDISPOSITION TO SEPSIS AND INFECTION

One's early surgical experience would suggest that any septic condition predisposes to sickling of the red cells, as it is very obvious that probably 50 per cent of the septic cases contain sickle cells, however, on reconsidering the condition it would appear that sickle cell disease is the initial factor present, and that this predisposes to the localisation of sepsis rather than the reverse The ultimate pathology associated with sickle cell disease is a blocking up of the small

blood-vessels in the peripheral vascular field As in the cases of pain due to intermittent claudication from vascular degeneration, so there is an interference in the blood supply of the peripheral field in sickle cell disease but for a different reason In sickle cell disease the small vessels become obstructed with packed sickle cells and the oxygen supply to the deep tissues becomes deficient, giving rise to muscular spasms with pain resulting No doubt the muscles in many parts are affected and the patient suffers from generalised muscular pains There is a marked dysfunction in the nervous system, exhibited largely by a disturbance of the autonomic system Disturbance of the spinal cord in spinal fracture cases usually causes marked abdominal distension, probably due to disturbed vascular supply of the spinal cord, so, too, the obstructive vascular disturbance due to sickle cell crises has a somewhat similar effect and the many abdominal sickle cell cases are of this nature, but this feature happens to present as a conspicuous element Marked headache and profuse sweating are almost always associated with the initial stages of sickle cell crises As the attack improves these become much less Sickle cell crises do not often kill patients though some fatalities have been noted One with apparent intestinal obstruction has already been mentioned He might not have died had operation not been undertaken It would appear, however, that following an attack most of the patients get better There may be much incapacity resulting from the complications of sickle cell crises Reference to two bone cases has already been made Golding,[13] working largely in the West Indies, made many useful observations, as recorded in his Hunterian Lecture to the Royal College of Surgeons of England (1956), on the significance of sickle cell disease in bone conditions To say that sickle cell disease causes osteomyelitis or Perthes' disease would not be far from the truth, yet these two conditions obviously occur all over the world in areas where sickle cell disease does not exist It would be more accurate to say that sickle cell disease predisposes to the localisation of bone disease, it certainly does do this This observation is most important A very high proportion of osteomyelitis cases in the tropics in African patients have sickle cells present in circulation It is noted from various reports that there is an unduly high death-rate from osteomyelitis all over Africa Having personally dealt with a very large number of these cases it is noted that the death-rate is much increased if oxygen is not given with the anæsthetic It is apparent that the death-rate is not higher even where sickle cells are present in circulation where oxygen is given with the anæsthetic The factor undoubtedly precipitating fatalities is the presence of sickle cells and a crisis being brought on by a degree of anoxæmia at operation, and not necessarily the osteomyelitis *per se* If this danger is appreciated and adequate care taken, the death-rate in osteomyelitis cases in Africans with sickle cell disease need not necessarily be unduly high The high proportion of tropical cases which contain sickle cells in the circulation is quite remarkable If a doctor is anxious to find patients with sickle cells for investigation purposes, he will have no difficulty in finding suitable cases if he pays attention to those housed in wards allocated for septic cases Caution must be exercised to avoid attributing all difficult cases to the presence of sickle cells This condition should not be diagnosed without confirmation by blood examination It may, however, be suspected before being confirmed

The practice of giving antibiotic drugs to all patients before clean operations is not considered a wise one It is better to rely on adequate preparation and careful aseptic technique than to relax these measures, relying on the efficiency of antibiotics If, however, a serious major operation is to be undertaken in a patient who is known to have the sickle cell trait, it may be justifiable to give antibiotics, realising that his chance of developing sepsis is very much greater than in a patient who does not have sickle cells in the blood The risk of sepsis in wounds in sickle cell patients is about twenty times as great as in patients who do not have sickle cells present Antibiotics are therefore justifiable before operation in patients who are known to have sickle cell disease if they are compelled to have a timed operation for any reason, in view of the increased risk of sepsis In all other patients meticulous aseptic technique should be relied upon and adequate preparation undertaken before operation

EXTRACTS

1 "Relation between Hæmoglobins 'C' and 'S' and Malaria in Ghana" G M Edington and W M Laing *Brit med J* 1957, 2, 143

	South Ghana Per cent	North Ghana Per cent
Hæmoglobin "C"	10	21
Hæmoglobin "S"	19	7

Hæmoglobin "S" disease constantly being eliminated by early death in the genotype SS "S" gene from each parent

Gene types and clinical effects "A" type indicates non-sickler

Blood Character	Genotype	Clinical Effect.
Sickle cell trait	AS	Little effect
[illegible]	SS	Very disadvantageous
	SC	Disadvantageous
[illegible]	AS + Th	Disadvantageous probably
[illegible]	AC	No disadvantage
Pure hæmoglobin "C" disease	CC	Slight disadvantage

The "S" gene may protect against *P falciparum*

The "C" gene may protect against some other disease not ascertained The type of hæmoglobin was determined by electrophoresis, paper method. It is of interest to note that the number of children dying with cerebral malaria who have no evidence of sickle cell trait suggests that sickle cells may give some protection against malaria Hæmoglobin "C" does not seem to give any protection against pyogenic infections, schistosomiasis, or tuberculosis

2 "The Sickle Cell Trait among the Zandi Tribe of Southern Sudan" P H Abbot *E Afr med J* 1950, 27, 162

One hundred cases tested with these results —

	Cases	Sickle Cell Trait
Tropical ulcer	19	10
Syphilis	18	1
Hernia	14	1
Circumcision	4	0
Abscess	12	0
Various others	33	6
	100	18 (18 per cent)

The high incidence in tropical ulcer cases is commented on over 50 per cent positive (sickle cell trait predisposes to ulcers)

3 "The Incidence of Sickle Cell Trait in Negro Population" E M da Silva *Mem Inst Osw Cruz*, 1945, 42, 315

State	Patients Examined	Sickle Trait Per Cent
Alabama	1,500	8 1
Chicago	1,263	9 4
Georgia	1,800	5 5
Tennessee	2,539	8 3
Texas	1,205	5 3
Rio de Janeiro	1,130	10 0

Average of sicklers in America amongst Negroes about 7 7 per cent

4 "Sickle Cell Hæmoglobin 'C' disease and Homozygous Hæmoglobin 'C' Disease in Nigerian Children" R G Hendrickse[16] *W Afr med J* 1958, 7, p 80

Sickle cell disease about Ibadan area, 20 per cent Hæmoglobin "C' found in approximately 5 per cent of patients

Blood Character	Genotype
Sickle cell hæmoglobin "C" disease	SC
Homozygous hæmoglobin "C" disease	CC
Sickle cell anæmia	SS

With hæmoglobin (SC) sickle cell hæmoglobin "C" disease you may get abdominal crises, and these have been mistaken for acute abdomens and opened in error

REFERENCES

1 HERRICK, J B (1910) Peculiar elongated and sickle shaped red blood corpuscles *Arch intern Med* 6, 517

2 ROBINSON, G (1945) A rapid method of detecting the sickle cell trait *Trans roy Soc trop Med Hyg* 39, 264

3 WILLIAMS, A W & MACKEY, J P (1949) Rapid determination of the sickle cell trait by the use of reducing agent *J clin Path* 2, 141

4 EDINGTON, G M & LAING, W M (1957) Relationship between hæmoglobin "C' and ' S and Malaria in Ghana *Brit med J* 2, 143

5 ABBOTT, P H (1950) The sickle cell trait among the Zandi tribe of Southern Sudan *E Afr med J* 27, 162

6 FOY, H, KONDI, H, REBELLO, A & MARTINS, F (1952) The distribution of the sickle cell trait *E Afr med J* 29, 247

7 *HARRIS, F C & LOMAX, G D (1954) Thalassæmia minor in an African in the Gold Coast W Afr med J* 3, 29

8 CHATTERJEA, J B, *et al* (1957) Hæmoglobin E Thalassæmia disease *Bull Calcutta Sch trop Med* 5, 94

9 CHI HSIONG LIU, *et al* (1950) Mediterranean anæmia with marked bone changes noted in a *Chinese female of 16½ years China med J 68, 203*

10 SHUKLA, R N & PARANDE, A S (1956) Occurrence of sickle cell anæmia in Nagpur *Indian J med Sci* 10, 892

11 DA SILVA, E C (1945) Incidence of sickle cell anæmia in Negro population *Mem Inst Osw Cruz*, 42, 315

12 SAUNDERS, G F T (1954) Sickle cell disease in general practice *W Afr med J* 3 22

13 SMITH W F, CONLEY, A (1955) Sicklæmia and infarction of the spleen during aerial flight *Bull Johns Hopk Hosp* 96, 35

14 OFORI ATTA, S (1954) Correspondence *Trans roy Soc trop Med Hyg* 48, 539

15 GOLDING, J S R (1956) Bone changes in sickle cell anæmia *Ann roy Coll Surg* 19, 296

16 HENDRICKSE, R G (1958) Sickle cell hæmoglobin ' C" disease and homozygous hæmoglobin ' C" disease in Nigerian children *W Afr med J* 7, 80

5

Helminthic Infections

PATTERN OF WORM INFECTIONS

THERE appears to be no known advantage gained by man in harbouring helminthic infections of any sort. The infestation of persons by worms gives rise to various forms of chronic ill health. Many acute illnesses also result from the adverse action of such parasites. Both directly and indirectly there is quite an appreciable death rate due to the various forms of worms affecting man. All parts of the body may become affected. The symptoms and signs which they give rise to are therefore of a most diverse character. Inadequate attention is often given to the manifestations of worm diseases. Many indications of worm infections are overlooked, as being of little importance. The seriousness of such conditions is inadequately appreciated by many doctors. Appropriate treatment is therefore often neglected unless an acute episode intervenes. The various groups of worms give rise to completely different signs and symptoms. Each worm group has a characteristic method of entering the body: some by the ingestion of food, which is infected with worm ova in some cases; or in others, entry through the exposed surface layers of the body with penetration of the skin. In some cases the infected bite of a mosquito provides the means of ingress for embryonic forms of the worm concerned. The ultimate location of the adult worm after it has gone through a fixed cycle of development remains fairly constant for each particular type.

Embryonic forms entering the intestine and penetrating the gut wall ultimately reach the radicles of the portal system and are therefore taken directly to the liver, where they may develop. Those embryos passing through the liver enter the systemic circulation and arrive at the capillary fields of the lung, giving rise to symptoms in that position. It has been appreciated for many years that ascariasis and ankylostomiasis both give rise to slight blood specking of the sputum at the early stage of the infections. Frank hæmoptysis rarely occurs in these conditions. Confusion may be caused by the slight hæmoptysis, and tuberculosis has been suspected on occasions; bronchitis due to worm infections also occurs. Because of the optimum position for each type of adult parasite being well appreciated, the secondary manifestations of worm diseases are not infrequently overlooked. Many forms of adult helminths give rise to loss of blood from various sites in the body with the development of marked anæmia. Chronic toxic symptoms are almost invariable; these may be due to the foreign protein matter contained in the parasites and slowly absorbed into the circulation. The absorption of the protein from food is interfered with by the presence of worm infections in the upper gut, and this may be a serious thing relative to the patient's state of health.

and nutrition This interference with the metabolism of protein is a marked contributory factor in malnutrition, especially in children, as pointed out by Venkatachalam and Patwardhan[1] in India In areas where protein food is already at a basic level, the defective absorption of what little there is available in the food may aggravate such conditions as nutritional œdema or kwashiorkor disease

A patient's physical fitness is markedly impaired by the harbouring of worm parasites In some cases this is due to the discomfort produced and to some degree by the anæmia dependent on the infection As a result of the allergic reactions developed, due to the presence of worms in the tissues, many unexplained forms of rash occur and urticaria is not uncommonly seen It may frequently be difficult to make a precise diagnosis as to the cause of the rash The presence of urticaria in children is sufficient to warrant an investigation for helminthic infections, various forms of examination are required relative to blood, urine, and stool Eosinophilia tends to occur in the blood, irrespective of the type of worm infection or the site of the body affected Low-grade fever and headache are common in many of the worm infections, especially in the early stage of the conditions, but this diminishes as the infection becomes chronic

The embryonic or larval stage of worm parasites entering the general circulation may reach the central nervous system, as reported by Browne[2] Nematodosis of the brain is well known These nematodes entering the central nervous system may or may not become encysted Children in the tropics appear to be more heavily infected with parasitic worms of the intestinal type than adults Adults on the contrary appear to be much more heavily infected with parasites of the filarial type, these are rather uncommon in the tropics in children under 7 years No age group is, however, exempt

The matter of worm infection during pregnancy is important In view of the strain of pregnancy and the marked anæmia induced in the later months, it is in the interest of all pregnant women that they should be investigated for worm infections and treated accordingly Preston,[3] working in Kenya, found that in pregnant women the infestation rate with intestinal parasitic worms of various sorts was 84 per cent, taking all forms of worms found on examination—a very high incidence When the infection rate gets well above 50 per cent it may be a great saving of time to treat all patients for worms rather than waste time excluding the small percentage who do not have worm infections The time factor is very important in "one-man stations" where the standard of treatment has of necessity to be substandard because of the large number of patients seeking treatment It seems reasonable to treat patients to some extent on mass production lines as soon as a fair sample of patients has been investigated for any particular condition In this way a fair judgment can be expressed as to the prevalence of any particular condition in a fixed district It is desirable, if time and staff are available, to examine patients individually where possible

The high incidence of worm infections in the tropics is in part due to inadequate sanitation and failure to deal with the vectors of disease With improvement in general education, better hygiene and improved water supplies, these diseases tend to decrease very much Much has been done by public

health propaganda The posters used by Public Health Departments explain in effective picture form the nature of diseases and the means of preventing them, such pictorial demonstrations to illiterate patients are very effective and should be encouraged

A heavily infected intestinal tract harbouring a large number of roundworms may become obstructed, due to the large mass of worms contained in it The *larynx and the trachea may also become obstructed* by worms giving rise to urgent symptoms Embryo worms of various sorts having entered the general circulation ultimately become deposited in a fixed optimum position, in most cases, for their continued existence On occasions, however, they may develop in sites at which they are not expected This gives rise to unexpected pathology, which is not easily recognised The existence of many forms of helminthic tissue abscesses is *well known, whether these be in muscles, fascial planes, the central* nervous system, or the deep organs A perforation from one tissue layer to another by any form of worm may give rise to serious consequences Intestinal perforations by ascaris worms, in children particularly, is a very serious condition The possibility that worms of the schistosome type may penetrate between veins and arteries giving rise to an arteriovenous communication, or fistula, involving the lower radicles of the portal system, is probably a potent cause of portal hypertension The high arterial pressure of the terminal arteries being communicated to the lower pressure portal system results in a maladjustment in the normal established balance with serious consequences

Sparganosis or tapeworm muscle abscess is well known It is particularly common in the Far East, but many cases have been noted in Africa Two cases of this condition have been noted personally in West Africa, seeing a tapeworm in an abscess for the first time is a very revolting sight Several cases have been reported in the literature from Africa The condition is probably much more common than is appreciated It takes great enthusiasm to examine the pus from all abscesses with this in view as the condition is usually not anticipated in Africa Fain[4] reported an abscess behind the ear in which a trematode worm was found, it was identified as being of the paragonamiasis type An abscess in the soft tissues of the neck has been dissected out on one occasion and found on opening to contain roundworms A photograph (Fig 11) taken of the opened cyst, although of poor photographic quality, is added in order to bring the condition more into prominence Hydatid disease is a major problem and represents the encysted stage of a tapeworm It is obvious, therefore, that the many metastatic forms of worm infections can give rise to very serious complications

The close relationship between epilepsy and cysticercosis in the tropics is now well appreciated Guinea worms give rise to much disability as a result of infection usually in the tissues of the leg The presence of guinea worms in tissues is frequently noted in X ray photographs following calcification Many mistakes are made in diagnosing the large cysts about the trunk which guinea worms give rise to Guinea worm cysts are almost invariably sent to surgical departments with a request for the removal of a suspected lipoma There is much pain associated with the sepsis induced by guinea worm in the tissues and much associated invalidism Contracture about joints due to this cause is often most

and nutrition This interference with the metabolism of protein is a marked contributory factor in malnutrition, especially in children, as pointed out by Venkatachalam and Patwardhan[1] in India In areas where protein food is already at a basic level, the defective absorption of what little there is available in the food may aggravate such conditions as nutritional œdema or kwashiorkor disease

A patient's physical fitness is markedly impaired by the harbouring of worm parasites In some cases this is due to the discomfort produced and to some degree by the anæmia dependent on the infection As a result of the allergic reactions developed, due to the presence of worms in the tissues, many unexplained forms of rash occur and urticaria is not uncommonly seen It may frequently be difficult to make a precise diagnosis as to the cause of the rash The presence of urticaria in children is sufficient to warrant an investigation for helminthic infections, various forms of examination are required relative to blood, urine, and stool Eosinophilia tends to occur in the blood, irrespective of the type of worm infection or the site of the body affected Low-grade fever and headache are common in many of the worm infections, especially in the early stage of the conditions, but this diminishes as the infection becomes chronic

The embryonic or larval stage of worm parasites entering the general circulation may reach the central nervous system, as reported by Browne[2] Nematodosis of the brain is well known These nematodes entering the central nervous system may or may not become encysted Children in the tropics appear to be more heavily infected with parasitic worms of the intestinal type than adults Adults on the contrary appear to be much more heavily infected with parasites of the filarial type, these are rather uncommon in the tropics in children under 7 years No age group is, however, exempt

The matter of worm infection during pregnancy is important In view of the strain of pregnancy and the marked anæmia induced in the later months, it is in the interest of all pregnant women that they should be investigated for worm infections and treated accordingly Preston,[3] working in Kenya, found that in pregnant women the infestation rate with intestinal parasitic worms of various sorts was 84 per cent, taking all forms of worms found on examination—a very high incidence *When the infection rate gets well above 50 per cent it may be* a great saving of time to treat all patients for worms rather than waste time excluding the small percentage who do not have worm infections The time factor is very important in " one-man stations " where the standard of treatment has of necessity to be substandard because of the large number of patients seeking treatment It seems reasonable to treat patients to some extent on mass production lines as soon as a fair sample of patients has been investigated for any particular condition In this way a fair judgment can be expressed as to the prevalence of any particular condition in a fixed district It is desirable, if time and staff are *available, to examine patients individually where possible*

The high incidence of worm infections in the tropics is in part due to inadequate sanitation and failure to deal with the vectors of disease With improvement in general education, better hygiene and improved water supplies, these diseases tend to decrease very much Much has been done by public

health propaganda The posters used by Public Health Departments explain in effective picture form the nature of diseases and the means of preventing them, such pictorial demonstrations to illiterate patients are very effective and should be encouraged

A heavily infected intestinal tract harbouring a large number of roundworms may become obstructed, due to the large mass of worms contained in it The larynx and the trachea may also become obstructed by worms giving rise to urgent symptoms Embryo worms of various sorts having entered the general circulation ultimately become deposited in a fixed optimum position, in most cases, for their continued existence On occasions, however, they may develop in sites at which they are not expected This gives rise to unexpected pathology, which is not easily recognised The existence of many forms of helminthic tissue abscesses is well known, whether these be in muscles, fascial planes, the central nervous system, or the deep organs A perforation from one tissue layer to another by any form of worm may give rise to serious consequences Intestinal perforations by ascaris worms, in children particularly, is a very serious condition The possibility that worms of the schistosome type may penetrate between veins and arteries giving rise to an arteriovenous communication, or fistula, involving the lower radicles of the portal system, is probably a potent cause of portal hypertension The high arterial pressure of the terminal arteries being communicated to the lower pressure portal system results in a maladjustment in the normal established balance with serious consequences

Sparganosis or tapeworm muscle abscess is well known It is particularly common in the Far East, but many cases have been noted in Africa Two cases of this condition have been noted personally in West Africa, seeing a tapeworm in an abscess for the first time is a very revolting sight Several cases have been reported in the literature from Africa The condition is probably much more common than is appreciated It takes great enthusiasm to examine the pus from all abscesses with this in view as the condition is usually not anticipated in Africa Tain [4] reported an abscess behind the ear in which a trematode worm was found, it was identified as being of the paragonamiasis type An abscess in the soft tissues of the neck has been dissected out on one occasion and found on opening to contain roundworms A photograph (Fig 11) taken of the opened cyst, although of poor photographic quality, is added in order to bring the condition more into prominence Hydatid disease is a major problem and represents the encysted stage of a tapeworm It is obvious, therefore, that the many metastatic forms of worm infections can give rise to very serious complications

The close relationship between epilepsy and cysticercosis in the tropics is now well appreciated Guinea worms give rise to much disability as a result of infection usually in the tissues of the leg The presence of guinea worms in tissues is frequently noted in X-ray photographs following calcification Many mistakes are made in diagnosing the large cysts about the trunk which guinea worms give rise to Guinea-worm cysts are almost invariably sent to surgical departments with a request for the removal of a suspected lipoma There is much pain associated with the sepsis induced by guinea worm in the tissues and much associated invalidism Contracture about joints due to this cause is often most

disabling Large numbers of embryonic worms can be found in the circulation of patients suffering from some forms of filaria Some types of filarial embryo can be detected in serum expressed from the skin when scarified or from "snippings" of skin when removed by scissors and forceps method Partial lymphatic obstruction due to the filarial group of diseases gives rise, in some instances, to a marked disturbance in balance between the hæmovascular system and the lymphatic drainage apparatus of tissues with resultant elephantoid complications Whereas many of the worm infections are associated with

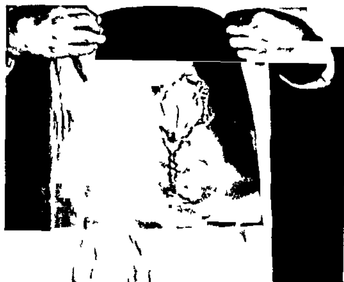


FIG 11

Metastatic ascaris worm abscess cavity dissected out

direct spread from man to man, many of the worm infections have essentially a primary and a secondary host, both being necessary for the completion of the life cycle of the parasite

In view of the nature of filarial complications a section is devoted entirely to diseases of filarial origin Schistosomiasis is also considered separately as there are many aspects of this disease to be considered It will be necessary to refer to complications of hydatid cysts under abdominal surgery as well as in the section devoted to diseases of the lower respiratory tract Hydatid disease may be found in any part of the body

It is hoped that by pointing out particularly the surgical conditions associated with worm infections more interest will be taken in the subject and greater attention paid to the treatment of such infections by those working in tropical countries An adequate appreciation of the importance of the subject of worm infections in surgical patients is essential to the proper conduct of surgery in the tropics It is only by paying attention to this form of chronic low-grade ill health that better surgical results can be obtained Many interesting observations on worm infections have been made, and it is hoped that by pointing

these out, following an inspection of the literature and from personal experience, the importance of the subject may be brought into better perspective relative to surgery It would be a considerable advantage if cases of metastatic worm infection were more freely reported, for these undoubtedly exist more commonly than is at present appreciated The sporadic accounts of various conditions indicate the widespread nature of these diseases, but most surgical textbooks make no mention of them at all To refer to them here will help to add some justification for the publication of this book

ASCARIASIS IN SURGERY

In describing the general pattern of worm infections some care was taken to avoid dealing with the individual types of worm specifically It is not easy to make entirely accurate general statements in referring to all groups of helminths It was necessary, at some risk to the clarity of the descriptions given, to avoid precise details, otherwise the information would of necessity have to be repeated in describing the individual groups It is now necessary to give more precise details Dealing with ascariasis, it can be mentioned that this worm parasite seems to occur in man all over the world The fact that ascaris worms have no intermediate host in their life cycle accounts to some extent for the fact that their distribution is universal in spite of the variable external conditions throughout the various parts of the world Man's body temperature remains almost precisely the same in all parts of the world Infection from man to man can occur quickly through contamination—by soiling of hands in infected persons It is likely that ascaris ova remain viable and potent so long as they remain within a few degrees of the normal body temperature, and are not subjected to undue drying Ascaris worms, as seen when passed, vary from 2 to 6 in long These worms, like many others, lay enormous numbers of eggs Even if the number of female ascaris worms in the bowel of the infected person is small, it is usually possible to find ova in the fæces on microscopic examination of even a small quantity of material The slightly oval crenated brownish appearance of the ova is quite characteristic, they are easily recognised Infection with ascaris worms is much more common in tropical countries than in temperate climates in most instances Children appear to be more heavily infected than adults It would appear from actual experience that female patients are usually more heavily infected than male patients Why this should be is not obvious Ascaris worms are frequently passed by infected persons if the body temperature rises above 103 F during an attack of any form of fever In the large cities, in temperate climates, the ascaris infection rate in children tends to be about 2 to 5 per cent In country villages, where sanitation is defective, it tends to be about double that rate Okpala,[5] in 1956, working in Nigeria, found on examination of 4,735 school children that 73 3 per cent showed ascaris ova in stools, 14 9 per cent had hookworms present, 38 9 per cent had trichuris ova present, 4 9 per cent other types of Strongyloides Ascariasis showed much the highest infestation rate Liang Shu-Fang,[6] working in Shanghai, China, found that the ascaris infestation rate was 23 8 per cent of patients examined

The method of looking for worm ova in stool specimens greatly influences the results. The infestation rate is found to be at least 50 per cent. higher if direct centrifugal flotation methods are employed. Details of procedures can be found in many of the laboratory textbooks. It was mentioned that each of the helminthic infections has a particular site where it is localised as being the optimum position for its continued existence. A very careful investigation was carried out by Makidono,[7] in Hiroshima, Japan, who, examining a large number of patients by radiological methods, estimated the location of ascaris worms very accurately. Going from above downwards, it was found that the infestation in the intestinal tract showed certain characteristics. The infestation rates were as follows: stomach, 0.34 per cent.; duodenum, 0.51 per cent.; jejunum, upper third, 29.4 per cent.; jejunum, middle third, 34 per cent.; jejunum, lower third, 23.5 per cent.; ileum, 11.3 per cent. Taking all parts of the jejunum together, it will be noted that 87.6 per cent. of the total ascaris worms were found in the jejunum. For easy reference it can be taken that nine-tenths of all ascaris worms are lodged in the jejunum. It was considered that this localisation of the worms in the upper part of the small bowel was probably determined by the fact that this area has least active peristalsis present of any part of the intestine. From his extensive experience he concluded that it was possible to say whether the worms were fixed in position or in the process of ascending in the intestine, or descending, that is, being expelled. This was judged by the contour which they assumed. Fixed worms tend to be pointing upwards and showing no looped curves. A barium X-ray photograph taken in West Africa of a small boy, thought possibly to have some form of a low-grade upper intestinal obstruction, shows this position very well (Fig. 12). His upper abdominal discomfort was probably due to worms, though this was not initially suspected. The X-ray photograph reproduced showed one large ascaris worm very obviously. He was treated for ascariasis accordingly and marked improvement resulted. Presumably the cause of his trouble was removed by the treatment.

It is well known that intestinal obstruction in the upper bowel gives rise to marked vomiting, whereas intestinal obstruction in the lower bowel gives rise to very little vomiting or none. Rombery,[8] discussing intestinal obstruction due to ascariasis, suggests that the vomiting associated with this condition may be due to some degree of obstruction caused by the worms present: this would appear a very reasonable suggestion, and it is very likely to be the case. If a patient vomits soon after taking food, as a result of ascariasis, it usually indicates that he has a very heavy infection present. Following treatment with a vermifuge in cases where vomiting has been a prominent feature, it is usual to find a very large number of worms expelled within forty eight hours. Showket el Zahawi and Ovanessian,[9] working in India, report on a child dying of intestinal obstruction due to a "ball of ascaris worms" becoming impacted in the upper intestine, and noted that at post-mortem examination an enormous number of ascaris worms were present. These were removed and weighed and the total weight found to be 2½ lb. Such an enormous mass might reasonably be expected to cause gross obstruction in the gut of a small child. In such cases a palpable mass may be detected on examination through the abdominal wall. In the same case one worm

was found at post-mortem to be coming through a hole in the chest wall There are several interesting possibilities as to how the worm might have reached that site In a young patient with persistent vomiting over several weeks, presumably due to a partial intestinal obstruction, the abdomen should be carefully examined with a view to feeling for any evidence of a mass of impacted worms being present in the area of the umbilicus Following treatment of ascariasis such a tumour, if detected, will disappear with the passage of an enormous mass of worms If the cause of an upper intestinal obstruction due to ascaris worms is not recognised before operation, the question arises when the abdomen is opened as to the best method of removing the worms present or ensuring that they are passed safely

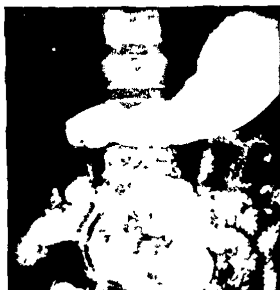


Fig 12
Barium X ray photograph showing ascaris worms in bowel

It is not always easy to dislodge a mass of worms, to do so forcibly may be followed by an urticarial reaction or damage to the gut Several writers have commented on the fact that if the obstruction cannot be easily removed by external pressure on the gut it may be safer, in some instances, to do an intestinal resection, removing the involved loop with the worms contained and performing an end to-end anastomosis in order to deal with the situation This is probably not often necessary, but it may be so and should be remembered In a case where laparotomy is undertaken for any condition, the nature of which has not been accurately determined before operation, the patient should be given a preliminary course of sulfasuxidine or other insoluble sulpha drugs suitable for intestinal disinfection The possibility of a partial gut resection being necessary in any laparotomy case should always be considered, and preparation made for such an eventuality An intestinal obstruction in a child necessitating gut resection is always a serious condition

The pain caused by ascaris worms is usually situated about the umbilicus, but its location may not be very accurately described by children Intestinal perforation by ascaris worms is a very serious complication The perforation is usually in the upper part of the ileum, a site which is higher than that found in most cases of typhoid perforation Typhoid perforations are usually within 2 ft of the ileocæcal junction, that is, much more distal than is the case with ascaris worm perforations The involved loop may actually be lodged in the pelvis but the perforation is anatomically more proximal than that found in typhoid cases The small intestine is attached to the posterior abdominal wall by its mesentery, from the upper left part of the abdomen to the lower right side in the region of the ileocæcal angle An ascaris worm perforation of the intestine is found most frequently in the middle third of the small bowel The initial pain produced by this condition is felt most often slightly to the left of the umbilicus The site of the pain corresponds to the position of attachment of that section of the mesentery which holds the part of gut which is perforated A typhoid perforation pain is usually about the umbilicus or to the right of this area and slightly below. From actual experience it would appear that an ascaris worm perforation is initially a small perforation which leaks just a little, and most patients who are brought into hospital suffering from this condition are found to have had the severe abdominal pain for three or four days' duration These patients usually give a history of sudden severe pain without apparently having been previously ill In the case of most typhoid perforations, whereas it is more common to find the perforation in a patient who has been ill for ten days to two weeks, the perforation may be the first sign of the typhoid condition This is, however, very unusual but has been noted in the case of a sailor who was on duty on a marine launch and said he had sudden severe abdominal pain He was found on examination three hours later to have an acute typhoid perforation At operation the diagnosis was confirmed The patient made an uneventful recovery following operation and the use of chloramphenicol at an early stage In ascaris perforation cases there is usually a marked inflammatory area close to the perforation area (Fig 13) showing large plaques of fibrinous material in the vicinity A loop of about 12 in is usually involved in this inflammatory mass, which becomes adherent to adjacent structures The small intestine is invariably dilated proximal to the position of the perforation In the case of typhoid perforations there is evidence of extensive intestinal disease present, with marked redness of the gut over an extensive area, and palpable thickening of Peyer's patches It is usually not difficult to differentiate between the types of perforation at operation It is sometimes difficult at the first clinical examination to decide if a perforation has taken place If a perforation is suspected at all, it almost invariably allows of an escape of some gas from the intestinal tract into the peritoneal cavity The most pathognomonic indication of a perforation having taken place is the detection of the presence of gas just below the diaphragm in an X-ray photograph (Fig 69, Chap 7) To see this best it is necessary to take the X-ray photograph with the patient sitting in the upright position so that the gas, which has escaped into the abdomen, will go to the upper part of the peritoneal cavity An X-ray photograph of a patient with a perforation is of no value for this purpose if taken in the lying-down

position It is most important that an X ray photograph should be taken in this sitting up position for any case of suspected intestinal perforation due to any cause This form of examination is more helpful than any other individual form of clinical demonstration in the detection of an intestinal perforation It is an emergency procedure and should be undertaken at any time of the day or night Many perforation cases are brought into hospital at night after the normal working hours of X-ray staff It is essential that the X-ray staff be summoned to undertake this emergency examination immediately, it should not be deferred until the next morning, otherwise there is an unjustifiable loss of time in dealing with the case Operation is indicated in all such cases The tissues of the intestine close to an ascaris perforation are usually very soft and will not hold



Fig 13
Ascaris worm perforation of small intestine

sutures well *in some cases It is advisable in many instances to undertake a* resection of the involved loop of gut It is necessary to remove 6 to 12 in and perform an end to-end anastomosis Frequently local closure of the perforation is not practical, and if sutures are put in they cut through almost immediately Flmes and McAdam[10] *comment on the advisability in some cases of ascaris worm* perforation with abscess *formation of undertaking a complete resection of the loop* of gut involved by the perforation, in view of the difficulty of making an adequate local repair of the perforation The pelvis is invariably infected in these cases Drainage of the pelvis is necessary in nearly all cases When a tube has to be inserted into the pelvis it is better to employ a separate opening in the abdominal wall below the main wound If the tube is put through the lower end of the abdominal wound an incisional hernia is very likely to occur later All possible measures should be taken following operation to deal with the peritonitis by using whatever is the most suitable antibiotic drug available It should not be

forgotten that the method of giving a blood transfusion in such cases, constantly used with great advantage before the introduction of antibiotic drugs, may still be a life-saving procedure and should certainly be undertaken in all cases as a routine and not only occasionally if the patient's condition is poor. Blood transfusion is frequently neglected in tropical countries because of the unwillingness of relatives to donate blood. There is little doubt, none the less, that in such cases as this it is a great advantage.

Although ascaris worms are passed through the large intestine in being evacuated they are not normally lodged there. Cases have been reported where ascaris worms have entered the appendix. Such a case has not been seen; it is probably very rare. Much more common is the occurrence of an ascaris worm [illegible]

interest to note that the presence of an ascaris worm in the lower part of the bile duct, which may be difficult to feel, was detected by aspiration of the duct with a serum needle and syringe. In a high proportion of such cases ascaris ova can be found in the aspirated material; this is a point well worth remembering. An accurate diagnosis can thus be made by examination at the time of the aspiration of the fluid, using a microscope in the theatre. It is often difficult to palpate a stone in the lower end of the duct; it may be much more difficult to detect a small ascaris worm, which is itself a tubular-like structure. The aspiration technique is therefore a valuable procedure and should be kept in mind. The entrance of an ascaris worm into the bile duct predisposes to cholangitis, by reason of infection entering the duct system. It is associated with rigors and high fever. Wang[11] reports operations for biliary ascariasis, 141 cases having been operated upon in six years in Tsingtao Hospital, China.

Considering many cases of intestinal obstruction of the band type in patients in the tropics, it is apparent that it is a condition commonly found. It represents about 25 per cent. of all cases of intestinal obstruction; in some localities more. From the large number of such cases seen the conclusion has been arrived at that many of these are due to a small inflammatory area having been produced following a leak from a minute ascaris worm perforation. Why only such a limited area of the abdomen should have such a strong mass of adhesions present is difficult to understand unless the condition is due to a small local lesion, such as a perforation of the gut, which was rapidly sealed off. This explanation seems the most likely. In going into the history of such cases it is noted that patients suffering from this condition almost invariably give a history of having had a very severe abdominal attack of some sort between four and eight months previous to the present obstruction. If this history is obtained it is very usual to find on opening the abdomen that there is a localised lesion, but in the areas some distance away from the actual obstructing band there is a considerable area of intestine which shows a jelly like substance on its serous surface. The explanation of this is not entirely clear, but it is suggested that this may be due to the escape of mucus-forming cells from the intestinal tract following the perforation, such cells continuing to live and producing a small amount of mucus in this new

position This jelly-covered intestine is found to be extremely slippery to rubber gloves when being handled, much more so than the serous-covered normal intestine Having had to deal with a large number of intestinal perforations due to ascaris worms, known in some cases and presumed so in others, the gravity of ascaris worm infection is fully appreciated, much more so than in the earlier days of surgical practice in the tropics It would appear that the mortality from ascaris worm perforations is now much greater than the mortality associated with appendicitis Infection with ascaris worms should be classed as a serious disease It seems that ascaris worms have a tendency to burrow into narrow orifices, and it is not very unusual to see an ascaris worm coming through a fæcal fistula, whether this be inguinal, umbilical, or elsewhere Wolf[12] describes a case of an ascaris worm coming through the umbilicus and bringing to light a persistent vitelline duct The umbilicus had not previously leaked fæces but must have been closed only by a very thin skin layer When an ascaris worm entered the duct from within, the thin skin membrane was easily perforated The worm came out through the umbilicus in this way leaving a residual fæcal fistula The case was efficiently dealt with by excision of the whole tract of the residual vitelline duct, with end to-end anastomosis, and recovery of the child resulted Such an operation should be undertaken with caution by those with limited surgical experience in the tropics as the operation may turn out to be much more difficult than initially anticipated An ascaris worm in the peritoneal cavity has been noted entering a Fallopian tube This is, of course, only an interesting rarity Patients should be treated for intestinal helminths if present before undergoing timed surgery on the intestinal tract This examination is often neglected An awkward situation occurred in one instance when, before completing a partial gastrectomy for a pre-pyloric ulcer, it was found that having gripped a loop of small gut to make the appropriate anastomosis with the back of the stomach, the loop incorporated in the clamp contained an ascaris worm within it It was necessary to remove the clamp in order to remove the worm After the worm had been pressed on distally the clamp was again applied Fortunately the bowel had not been opened before the worm was detected It is surprising that the worm was not detected before the clamp was applied It was not a very large worm and was probably in a flaccid condition when the clamp was applied, it soon contracted, however, under the stimulating influence of the clamp and became much more obvious Cases of ileocolic fistula, probably due to ascariasis, have been noted There have been reports, though no personal cases have been noted, where a vesicocolic fistula has occurred This was presumed to be due to an ascaris worm perforation, but it would appear that this is not a very likely cause An ileovesical fistula would appear much more likely in cases of bladder involvement The passing of an ascaroid worm from the bladder per urethram has been reported by Yeh and Jordan[13] The possibility of it having come from the rectum was considered but thought unlikely The patient was a female child The condition has been reported previously

It is surprising how infrequently vomiting occurs following major gastric operations, but it may occur if ascaris worms are present in the jejunum To rupture an abdominal wound as a result of vomiting or coughing is a very

serious complication That post-operative vomiting due to ascariasis should occur in a timed case suggests a lack of caution and anticipation on the part of the doctor responsible for the management of the case To treat ascariasis before operation is undertaken as a routine procedure is one way of decreasing this risk in surgery in tropical areas where the condition is very common In communities where ascariasis is known to have an infection rate of over 50 per cent it is obviously wise to undertake routine treatment of all patients for worm infections with a view to decreasing the operative and post-operative risks Patients welcome such treatment, it is easy to carry out In a station where little assistance is available and much work to be done, it is much better to *treat all patients for* ascariasis as a routine than waste time in looking at specimens where the inevitable advice, in more than 50 per cent of the cases, is that treatment should be given As has been previously noted, ascaris embryos hatch in the upper intestines and penetrate the gut wall They enter the portal circulation and are so carried to the liver They subsequently reach the lungs Emphasis is seldom *laid on this point, though it is perfectly obvious It is not difficult, therefore, to* understand how the embryos may develop in the liver

A case reported by Ocampo,[14] in the Philippine Islands, describes an abscess of the liver filled with ascaris worms Other similar cases have also been reported This metastatic manifestation of ascariasis is most important, and although it may not be common it is a very serious condition, and one which is not very *likely to be suspected unless the possibility is kept in mind It seems that abscess* of the liver due to ascaris worms is more common in the case of patients infected with ascaris worm of the *Toxicara cati* and *Toxicara canis* variety An abscess in the superficial tissues due to ascaris worms also occurs but is a rare condition A photograph illustrating the condition (see Fig 11) is unfortunately of a poor standard, but it is included in order to lay emphasis on the possibility—a chronic inflammatory mass having been dissected from the neck area under the *impression* that it might be some form of chronic inflammatory cyst An abscess in the superficial tissues of the neck due to worms was described by Winckel and Treurniet,[15] working in the Philippine Islands, similar to that encountered in West Africa The worm concerned in the report from the Philippines area was thought to be of the *Lagochilascaris minor* variety

In tropical practice there is a great demand for worm medicine *of all sorts* Patients usually accept worm treatment very willingly Many complaints are attributed in the lay mind to worm infections, and this is *obviously with very* good reason A large number of patients suffering from abdominal pain are found to have worm infections in tropical countries Santonin has been used in the treatment of ascariasis during the past fifty years, and with fair success If adequate advice is given as to the method of taking it, and the *patient carries out* the instructions carefully, considerably m

cleared of worm infections by this drug,

to the age of the patient, from $\frac{1}{4}$ to 3 gr

age and weight Santonin should be accompanied by an aperient It is usual to give either pulv hydrarg cum crete or pulv gallop co, both work well Toxic symptoms have been reported, *and if patients are asked they may admit*

that there has been some discoloration in vision with yellowness being apparent This temporary interference with colour vision does not appear to be a very serious complication or of a permanent nature Some deaths following the use of santonin have been reported in India, it is therefore necessary to use santonin with some caution Liang Shu-fang [6] advised the use of santonin given through a duodenal tube as being a more efficient means of getting a high concentration of santonin into the area where the worms are lodged

Oil of chenopodium in treatment is more efficient than santonin, but it would appear rather more dangerous The toxicity of oil of chenopodium was abruptly brought to the notice of the staff of a large hospital in West Africa when on one occasion a mother brought four children to the clinic to be treated for worm infection Oil of chenopodium with castor oil was given in appropriate doses, and three of the children died the same evening Such a catastrophe was a very serious warning to all members of the staff to exercise great caution in the use of this drug An investigation following this incident did not appear to reveal any evidence of carelessness on the part of the pharmacist who dispensed the medicine It appeared to have been a genuine case of idiosyncrasies, which sometimes occurs In using oil of chenopodium the dose should not exceed 1 minim per year of age under any circumstances The maximum total dose per treatment is 15 minims The total appropriate dose, whatever that may be, depending on the age of the patient, should be given in two divided doses with an interval between them of three hours The patient should be taken off food for twenty-four hours during treatment A preliminary dose of a saline aperient is administered the evening before the worm medicine is due A further saline aperient should be taken three hours after the second dose of castor oil with chenopodium If this is done it is unlikely that toxic symptoms will occur Toxic symptoms are much more likely to develop if food is taken during the treatment as the oil of chenopodium is not evacuated quickly but absorbed Oil of chenopodium has the advantage that it is suitable in treatment of ascariasis as well as ankylostomiasis It is therefore preferred in many clinics to santonin because of its combined action

A large single dose of mepacrine up to a maximum of 0 9 gm for an adult is reasonably efficient in clearing ascaris worms Appropriate smaller doses can be given to younger people Mepacrine has the advantage of also being effective in treatment of threadworms and tapeworms It should be followed three hours later by a large saline aperient

The newer drug, piperazine citrate, in various preparations, liquid or tablets, is a very efficient and very non toxic drug, and has been introduced with great success in the last five years It is not so unpleasant to take as oil of chenopodium It is suitable for treatment of ascariasis and threadworms Atchley, Wysham and Hempil,[16] working in Kentucky, U S A, reported on its efficiency, giving the dosage used according to the body weight of the patient With adequate dosage they report 100 per cent clearance or ascaris worms It does not appear necessary to withhold food while this anthelminthic drug is used This is an advantage, whereas patients may be advised to take very light diet, it is not essential to fast

Using antepar, it has been found that with children of 1 to 3 years of age,

½ oz given in four single dram doses is reasonably efficient Children from 3 to 7 years of age should be given up to 1 oz in eight single dram doses From 7 to 15 years of age, 2 oz can be given, using 2 dram doses on eight occasions at four-hourly intervals Full-sized adults can take up to 3 oz, ½ oz doses being taken three times a day for two days No toxic symptoms have been encountered using this drug on many occasions, it certainly is not unduly unpleasant to take It can be recommended for treatment In tablet form, under the name of entacyl, it can be taken as one tablet three times a day, or two tablets three times a day, depending on the body weight

Hetrazan is considered an unsuitable drug for treatment of ascariasis, it gives rise to intolerable scratchiness to prevent this it has to be given with an antihistamine drug Its efficiency is considered low for the purposes of treatment of ascaris worms so it is not recommended

Carbon tetrachloride has been used extensively for the treatment of ascaris worms, but again it is not very safe and it is very liable to deteriorate, giving rise to toxic symptoms if the supply is kept in a dispensary and exposed to strong sunlight The dose is ½ to 1 dram It may cause damage to the liver

Worm medicines are much easier to take in capsule form than otherwise because of the unpleasant taste of most of them Medicines in this form are made up by many of the commercial firms They may be a little more expensive in this form but save a lot of time in dispensing Their use is recommended in [illegible]

[illegible] technique in the *Lancet*, London *An extract is appended for those who like to* try this form of treatment It appears to be very efficient and very safe No complications have been noted and the method is quite novel In U S S R it is used *for out-patients, and with little practice a nurse can be trained to assist in the* management of the necessary technique A gastric tube is passed through the nose into the stomach It is much easier to get a patient to swallow a stomach tube passing it through the nose rather than through the mouth This has been found to be the case from experience in surgical wards Some of the nurses become excellent in undertaking this manœuvre with a little practice The method of measuring 1 or 2 litres of oxygen may give rise to a little difficulty A pneumothorax apparatus can easily be used attached to an oxygen cylinder, the bottles being used to measure the volume of oxygen required by displacement of water from one bottle to another If, however, the apparatus is not available, the oxygen can be given through the nasal tube with an attached length of rubber tubing to the oxygen cylinder In order to measure the volume necessary, a [illegible] T tube A rubber [illegible] before and after the [illegible] n quite easily, and subsequently let off at intervals into the patient's stomach as recommended An ordinary child's spherical balloon can be used, it is not usually difficult to get, and can easily be sent by an airmail letter-post from the main trading centre to more remote places By using a centimetre *scale* and two *uprights attached to*

the scale the figures given in the extract show the width of the diameter of a rubber balloon when it contains known volumes of gas, ½ to 2½ litres If the balloon is placed between the two fixed uprights on the scale the correct volume can be introduced With a little adjustment and corking of a hot-water bottle of a known volume it can be used if necessary instead of a balloon It seems that ascaris worms in the intestines cannot tolerate the high oxygen content induced by this technique One litre of oxygen is given slowly over a period of seven to fifteen minutes, allowing the oxygen to enter the stomach intermittently If oxygen is given too quickly it may be belched out again from the stomach A saline aperient is given two hours after the treatment The gas which slightly distends the stomach initially appears to be passed into the intestines and absorbed slowly, it is not evacuated per rectum The worms are passed dead within two to three days

Vora,[18] in India, made an interesting comparison between the efficiency of intragastric oxygen and santonin It was found that intragastric oxygen technique was more efficient than santonin treatment, and was also much cheaper Such treatment is suitable for children and adults who can co-operate in the method Tiny children were not treated by this method in the Russian series because it was considered that the difficulty of passing a stomach tube was considerable If, however, a rubber urethral catheter end is dipped in a sugary solution a tiny child will swallow it very easily and with care it might be possible to undertake the treatment in them also—the tendency of small children to swallow anything they can get hold of is notorious The use of a sedative in small children might also help The method of intragastric oxygen for ascariasis is of considerable interest and its use might well be given a trial in view of the fact that it appears to be devoid of complications and not unduly unpleasant It is certainly very efficient No record has been found as to the effect of intragastric oxygen on other forms of worms other than ascaris It would be of value to hear of the effect of this form of treatment for the various other helminthic infections Hydrogen peroxide per rectum has been used in the treatment of threadworms This aversion of helminths to high oxygen contents may be a general character of intestinal worms The possibility of using tablets which give off oxygen when swallowed is an obvious suggestion, but does not seem to have been tried so far

ANKYLOSTOMIASIS

Ankylostomes are small helminths about 1 cm long These intestinal worms are lodged primarily in the duodenum and upper part of the jejunum The parasite spreads from man to man and there is no intermediate host In damp soil contaminated by infected fæces the ova of this parasitic worm hatch out The larvæ penetrate the skin of the lower extremity, usually about the soft skin of the dorsum of the foot Any part of the body may be contaminated by infected water, as is known from personal experience Contaminated river water, used for bathing by necessity rather than choice in country stations, is a potent source of infection Having developed an excessively scratchy area of dermatitis on the calf of the right leg, this condition was suspected and a photograph taken

of the inflamed area Six weeks later the presence of ankylostomiasis was confirmed by the necessary laboratory examinations The infection was eradicated by appropriate means with no recurrence of infection It is easy to see the localised area of dermatitis in a light-coloured skin Few, however, note the area of dermatitis in a patient with a dark complexion, the inflamed area is not easy to see in such patients Very few doctors can say that they have really noticed an area of dermatitis which could definitely be attributed to the entry of ankylostomes The larvæ enter the systemic circulation after penetration of the skin The pulmonary capillary fields are ultimately reached by the larvæ Small flecks of blood may be noted in the sputum of infected persons In a community which is heavily infected with ankylostomiasis it is not apparent that gross hæmoptysis is ever caused by this worm infection The developed larvæ migrate from the lower lung field via the trachea into the hypopharynx, they are swallowed with sputum thus entering the stomach, duodenum, and jejunum, where they become attached, as being the location most suitable to their continued existence

The infestation rate with ankylostomiasis in any country seems to be very variable from place to place In some districts, especially in wet localities, the infection rate may be as high as 90 per cent of the population Where the infection rate is high it is apparent that in those districts there is marked evidence of anæmia in the local population, the hæmoglobin level being on the average very low The typical characteristics of patients infected with hookworms is the marked anæmia present, with secondary symptoms associated with this state Patients look very pale about the conjunctiva and mucous membranes, they lack energy and are often short of breath Such symptoms are not to be wondered at considering the low hæmoglobin levels, often as low as 40 and even 20 per cent in some patients In most heavily infected districts the hæmoglobin level is on an average about 50 per cent Patients complain of vague epigastric pain and a sense of nausea, though vomiting is unusual A pain about the dorsal region posteriorly is very usual in ankylostomiasis as is also the case with other duodenal conditions This parasite being of small size does not cause any intestinal obstruction as is the case with ascaris worms at times This absence of vomiting is probably due to the lack of partial obstructive symptoms such as occurs in ascariasis, where vomiting is very usual Apart from the anæmia produced by ankylostomiasis and the tendency of any patient with low hæmoglobin to collapse easily under anæsthesia, this parasite does not give rise to any particular symptoms Metastatic nematodiasis due to ankylostomes has very seldom been recognised other than in the lungs As, however, the larvæ enter the systemic circulation they might well appear in other places than the lungs Unfortunately it is not always easy to get worms accurately identified if found in remote places unexpectedly, but this should be done The parasites can be put into solutions to preserve them and be identified later at the larger laboratory centres

Ankylostomiasis is rather of the nature of a low grade chronic condition, giving rise to malnutrition and anæmia Puffiness of the face is frequently seen The blood protein level in ankylostomiasis is known to be low and there is marked hydræmia this latter fact accounts to some extent for the puffiness of the face

It has been noticed that in heavily infected ankylostome districts duodena ulcers appear to be unduly common, especially in young people It is difficul to prove that ankylostomiasis is a contributory factor in this condition Th finding of large duodenal ulcers in children between the ages of 10 and 15 years as has been found on several occasions in patients suffering from hookworm infections, suggests that ankylostomiasis and associated anæmia may b contributory factors in ulcer formation of this type of ulcer in tropical areas I temperate climates no attempt has been made to correlate the incidence of worm infections with peptic ulcers of any sort, and duodenal ulcers are probably ver rare in the northern hemisphere in patients under the age of 16 Duodena ulcers become increasingly common in patients beyond this age It would appear that in surgery in the tropics ankylostomiasis might reasonably b considered as a contributory factor in the formation of duodenal ulcers I young patients with X ray evidence of a duodenal ulcer and also ankylostomes it i essential that the patient be treated carefully for hookworms as well as for th ulceration He should be critically examined again radiologically, where this i possible, within three months

Patients frequently come to hospital with an acute enteritis and o examination of the stool specimen ankylostomes are found to be present Wherea ankylostomiasis may be associated with an unhealthy state of the upper intestina mucous membrane, it cannot be said that ankylostomiasis *per se* gives rise t acute attacks of diarrhœa It is much more likely that the patient is incidentall suffering from an attack of acute bacillary dysentery and that the hookworm ov found in stool specimens are only incidental In such cases it is probably muc wiser to treat the patient with one of the insoluble sulpha drugs first to clear up th acute enteritis and treat the ankylostomiasis at a later date, possibly some week after the attack of diarrhœa Other forms of acute dysentery must also be kep in mind All patients with ankylostomiasis should be treated There is n evidence to prove that ankylostomiasis is a factor directly related to the formatio of tropical muscle abscess The poor condition of any patient suffering from heavy infection of ankylostomiasis may predispose to a lowered resistance t infection of any sort by reason of the anæmia induced

Pregnant women particularly require treatment for hookworms in the tropics The marked anæmia associated with the latter months of pregnancy is muc aggravated by the additional strain of loss of blood through ankylostomiasis Th associated anæmia due to this combination of causes may be a predisposin factor in the loss of a pregnancy It is not always a practical proposition to insis on the wearing of shoes by all members of the community with a view t guarding against hookworm infections but that footwear should be worn i desirable Inadequate protection is afforded by locally made sandals consistin of a sole only, with a single strap between the first and second toes to keep th sandals in position Such sandals are worn because they are cheap, cool, an comfortable and protect the sole of the foot on rough ground They do no give adequate protection against hookworms There is no obvious advantag clinically in discriminating between the different sorts of hookworms *Ankylostom duodenale* and *Necator americanus* produce the same disease clinically Th

different number of nuclei in the ova is of academic interest only but of no practical importance Hookworms should be treated before all timed operations, as has been mentioned under the section on nutrition relative to surgery Treatment for hookworm with oil of chenopodium is given as indicated for ascariasis 1 minim of the oil is given for each year of age, up to a maximum quantity of 15 minims given with castor oil, the total being divided into two doses It should be preceded by a saline aperient and followed by a further saline aperient The patient should be off food for twenty-four hours during the treatment, water only being allowed, or tea, but no solid food If this practice is followed toxic signs are unlikely to occur About twelve toxic reactions have been noted in patients treated with oil of chenopodium No personal accidents have occurred, but patients have been seen in consultation suffering from this misfortune and of these, six have died, this is not a very large number in several thousands seen and treated by myself and my immediate colleagues working in the same hospital during twenty-three years, but it is none the less very serious The toxic cases have all been noted in children of the 3, 4, and 5 years of age group No cases have been noted in children over the age of 7 years, or in adults The toxic signs bear a marked resemblance to saponin poisoning, seen in the case of *ackee* fruit sickness the children go to sleep and just cannot be wakened They ultimately die in a state of coma Whether there is any relationship between these two types of poisoning is not certain In the glucoside poisoning of *ackee* fruit sickness the use of cortisone is very beneficial Although it has not been tried in the case of chenopodium poisoning it is suggested that it might be of great benefit

Kanzler,[19] working in Ghana, has made a very interesting observation on the treatment of ankylostomiasis Examining patients before and after treatment with oil of chenopodium and having regard to the hæmoglobin levels, he noted that the clearance rate with treatment was much better in the case of patients whose hæmoglobin level was relatively high He has therefore made it a practice to try and raise the level of the hæmoglobin considerably—10 to 20 per cent at least—before giving treatment for the hookworm In many cases the hookworms are not causing very severe symptoms, although there is a marked anæmia But if a patient is treated when the hæmoglobin level is low, it is found that the worms are seldom completely cleared If, however, the patient is treated actively with iron first for two or three weeks, and subsequently given hookworm treatment, he derives much greater benefit in that the worms are usually completely cleared by one treatment and the general health improves rapidly This is quite a valuable observation It is simple and appears to be very sound For surgical purposes it is desirable to treat the patient as quickly as possible to get him into the best possible state for operation Treatment on two occasions is desirable, if this is possible, and full doses of iron given between these treatments If a patient is heavily infected with ankylostomiasis and his operation is not urgent, it may be necessary to defer operation for more than four weeks rather than undertake an operation at a considerable degree of risk when the hæmoglobin level is too low It has been made a practice to consider 50 per cent of hæmoglobin as a basic level at which a timed operation is considered permissible It is obviously desirable

several of the upper teeth These cases when they become quiescent present a serious problem in plastic surgery for closure of facial or palatal defects Osteomyelitis is an inflammatory condition, but it is mentioned as it often causes difficulty in diagnosis and may easily be mistaken for a jaw tumour at some stage The presence of sickle cells in the blood is strongly suggestive of the condition being due to osteomyelitis rather than tumour formation

Osteoclastoma gives rise to an enormous swelling of the jaw due to an expanding process within the bone cavity The lower jaw in almost all cases is affected rather than the maxilla Pathological increase in the activity of the



FIG 272
Very large osteoclastoma of the mandible in a boy aged 12 years Photograph by kind permission of Dr M J G Furnell

endosteal cells of the medullary cavity gives rise to excessive bone absorption and, by the compensatory laying down of new bone by the periosteum, ultimately results in enormous expansion of the jaw bone An eggshell like tumour is so formed which has a characteristic " eggshell crackling " detectable when it is pressed upon gently (Fig 272) This growth has many features present comparable to the giant cell tumour found in the upper end of the tibia or bones of the forearm It is considered to be on the border-line of malignancy It forms no secondary growths in the regional lymphatic glands To say it is locally malignant is a compromise and suggests that the term malignant is antiquated and rather unsatisfactory An osteoclastoma is certainly a dangerous tumour as an operation for its removal is a major surgical undertaking The extent of the operative field is in itself a major factor in the production of shock The growth is a true jaw tumour All the teeth are present on the surface of the growth True dental

this condition In young female patients it may give rise to vaginal discharge Threadworm ova can usually be found in the local discharge, though they are not often looked for Many patients in Europe who have repeated attacks of appendicular colic are found on removal of the appendix, which looks apparently normal, to have many threadworms in this structure when it is opened Minute hæmorrhages of the mucous membrane are apparent in most of these cases, but *no generalised inflammation* *Symptoms disappear with the removal of the* appendix It seems very likely that the presence of threadworms in the appendix gives rise to the symptoms by precipitating spasmodic contractions From experience it would appear that threadworms in the appendix are not so common in the tropics as they are in Europe They have, however, been seen on a few occasions in tropical cases

Many forms of treatment have been suggested for the removal of threadworms The old-fashioned method of giving a quassia-chips enema has been found beneficial, and patients are usually considerably relieved, if not cured, by this method Quassia powder is easier to use than quassia chips and can be purchased for this purpose With the change-over from quinine to mepacrine in the treatment of malaria, about 1939, it was noted that there was a marked decrease in the number of patients complaining of threadworms following courses of mepacrine for malaria Mepacrine has become one of the standard methods of treatment for threadworms, and it is also used for the removal of tapeworms It has proved detrimental to several of the worm parasites in the bowel For the purpose of treating intestinal parasites, mepacrine is given in one massive dose 0 8 gm is recommended for an adult, that is, eight 0 1 gm tablets McKinnon,[20] using this method in the treatment of tapeworms, found that the mepacrine was less likely to be vomited if instead of giving the total dose of 0 8 gm in a single dose it was given in four divided doses over a period of twenty minutes two tablets every five minutes for four doses Sips of alkalis may be given between the doses A large dose of mepacrine frequently causes slight gastritis the alkalis are therefore an advantage Half an hour after the mepacrine has been taken a large saline aperient should be given, in order to make the bowels act freely After this treatment is given for threadworms it is desirable to give the patient a warm dettol bath in order to cleanse the skin about the perineum Dettol has a marked detergent action, removing a considerable amount of the desquamating cells, this is an advantage in such cases Following the bath a stronger solution of 10 per cent dettol can be applied about the sacrum, perineum and groins Solutions of dettol beyond 10 per cent strength may cause burning of the skin and so should not be used Proportionate doses of mepacrine, depending on the body weight, can easily be calculated for children, taking it that an adult is 10 stones, a child may require only a quarter or a third or a half of the adult dose The use of piperazine preparations has given excellent results in threadworm infections, it is easy to take, and although somewhat expensive it is very effective The use of piperazine preparations appears to be devoid of complications, it is a safe drug to use The dosage required is usually given with the proprietary preparation supplied for each type of parasite to be treated The use of hydrogen peroxide, 2 to 5 per cent solution, given per rectum as

to have it much higher than this if possible in the case of non-urgent operations, it may be desirable in some cases to defer the operation for a further month Patients are very disappointed by delay, but if it is tactfully explained to them that this delay is in their own interest, and the risk of operation is much lower by getting them into better condition, they are usually very willing to accept the explanation given

THREADWORMS

The popular term "threadworm" is applied to the small white parasitic worm of man called *Oxyuris vermicularis* This parasite inhabits the large bowel The adult female form is 1 cm long The male worm of the same species is said to be much smaller This form of worm is very well named threadworm as it closely resembles a short piece of white thread This helminth is most commonly seen about the perianal skin of the infected patient when a rectal examination is about to be carried out It can also be seen easily on examining a specimen of stool from a heavily infected patient, particularly in children The ova are easily recognised under the microscope Their appearance resembles pale-yellow plastic capsules which have been flattened slightly on one side The ova can be found without much difficulty about the perianal skin A cellophane swab is used on a matchstick and the area stroked with this and examined under the microscope The method of applying a piece of sellotape to the infected skin area between the coccyx and the anus is also easy to carry out The piece of sellotape, after it has been touched on the infected area, is then stuck on a glass slide and examined under the low power of the microscope

Figures representing the infection rate in patients have been collected from seven different European countries It has been found that in Europe the infestation rate with this parasite is, on an average, 67 per cent of all patients examined This figure is much higher than is popularly believed to be the case The examinations, however, were carried out in centres of repute and are considered accurate The general belief is that patients in the tropics are more heavily infected with this parasite than in temperate climates This may or may not be the case The parasite is not very frequently looked for, because it does not give rise to very severe symptoms It is considered more of a personal nuisance than a serious danger There is very little written in the journals concerning threadworm infections No figures have been found indicating the infestation rate in various parts of the tropics Once a patient is infected with this parasite the perpetuation of the infection is of the cyclic variety The infected patient continues to reinfect himself by scratching the perianal area, usually during sleep, and then reinfecting himself with contaminated fingers when handling food The common habit in many tropical countries of patients keeping one or more fingernails long, for the purpose of scratching themselves, is to be deprecated It is a potent means of transferring infected material from one part of the body to another

Oxyuris vermicularis does not give rise to obvious toxic symptoms, three clinical conditions are noted which it gives rise to Pruritus ani is well known in

The primary hosts of most tapeworms do not usually act as secondary hosts also *Taenia saginata* is the most commonly seen tapeworm lodged in man who acts as his primary host Cattle act most commonly as the secondary host for *T saginata* It is therefore in cattle that the secondary encysted stage of *T saginata* is noted This is sometimes referred to as hydatid disease of cattle or cysticercosis bovi these two are synonymous The infestation rate of cattle with *Cysticercus bovis* varies greatly from place to place in the same country and markedly so between different countries Perpetuation of *T saginata* infection is largely accounted for by the fact that some people like eating undercooked meat Some communities of the Eastern Mediterranean area reluctantly admit that they eat raw meat Adequate cooking of meat is the greatest safeguard against the spreading of infection In one of the main towns in West Africa it was a Public Health Regulation that no uncooked pork meat should be sold in the market This was a measure taken to eradicate *T solium*, the pig tapeworm

The encysted stage of *T saginata* in cattle is given by Silverman,[21] in 1956, as being from 0 5 to 3 per cent of cattle slaughtered in some of the large towns of the British Isles at controlled centres Griffiths,[22] writing on the same subject, gives an analysis of the infestation rate in carcasses of cattle found at the slaughter-houses of some of the large cities of Great Britain and Ireland These rates were *Glasgow, 1 2 per cent , Dublin, 0 58 per cent , Edinburgh, 0 47* per cent , Birmingham, 0 28 per cent , Belfast, 0 23 per cent , average infection rate, 0 55 per cent approximately—1 in 200 carcasses were considered infected This small proportion of cattle infected is not likely to give rise to many cases of tapeworm The obviously infected carcasses were rejected but lesser infected carcasses may have been passed unnoticed In view of the extensive importation of meat from one country to another it is possible that an area where there is no known *T saginata* present may have the disease introduced Man does not seem to act as a secondary host to *T saginata* Hydatids, by self infection, have not been recognised with this type of tapeworm, but it is possible that they may exist occasionally Man may act as the primary host of many other forms of tapeworm The broad tapeworm or *Dibothriocephalus latus* is found in man It is usually a tapeworm of dogs, cats and pigs The secondary host is usually of the fish class It is known to infect man most commonly by the eating of undercooked infected fish There are other less well known species of the Dibothriocephalus group—*Dibothriocephalus minus*, etc The identification of the various types of tapeworm infecting man is a matter for the experts in parasitology *Taenia solium* is normally a tapeworm of pigs, which act as the primary host Man may, however, also act as the primary host for this parasite It is this tapeworm which gives rise to the various manifestations of cysticercosis which is the encysted hydatid or secondary manifestation of *T solium* The importance of man acting as a primary and also as a secondary host for *T solium* should be appreciated Whether man develops cysticercosis as a result of ingesting the *T solium* ova from pigs or whether the *T solium* ova are ingested as an auto-infection is a matter of conjecture The miniature tapeworm known as *Hymenolepis nana* has a very widespread distribution in the tropics and temperate areas of the world This minute tapeworm appears to have no intermediate host

an enema, has been found effective in removing some of the worm parasites of the large intestine It is interesting to correlate this method with the recent [illegible]

The vaginitis seen in young female patients due to threadworms can be cleared up quite easily by the use of frequent washing with sodium bicarbonate solution. The patient must, of course, be treated for the infection in the colon The recent introduction of oxytetracycline (2 gm daily for five days) for adults has been found most effective in treatment of threadworms A total of 10 gm should not be exceeded in an adult, and proportionately smaller doses should be used for young people Tetracycline drugs are not devoid of danger, they predispose to a marked disturbance of the normal intestinal flora, there is some risk of intestinal fungoid infections following their use It is probably by the alteration of the intestinal flora and changing of local environmental bowel conditions that they work, the new conditions being unsuitable for the continued existence of threadworms They certainly appear to be very effective in treatment and can be recommended for use in cases where the other methods have failed As threadworms do not enter the general circulation, no metastatic complications have been found elsewhere in the body

TAPEWORMS

As has previously been pointed out, the life cycle of the tapeworm group of helminths is associated with a primary and secondary host The primary host of any sort of tapeworm lodges the parasite in the intestinal tract in the tapeworm-like form Whereas the adult tapeworm gives rise to vague abdominal discomfort from time to time the condition is seldom particularly dangerous It is æsthetically offensive to most individuals to notice tapeworm segments being passed in the motions The mature tapeworm segments, containing ova, are disseminated with fæces and directly or indirectly contaminate food In this way they are ingested by the secondary host These ova develop and hatch out larvæ which penetrate the gut wall The larvæ enter the portal circulation and in this way the liver and later the lungs become infected Any part of the body may thus be reached by embryonic worms When the larvæ are finally deposited in fixed tissues they become encysted To these cysts the term "hydatid" has been applied The term "hydatid" means a cyst containing water and is a general term There is a hydatid or cystic form for all the tapeworms The term "hydatid disease" is usually used in its limited sense as referring to the large cysts found in human beings associated with the dog tapeworm *Echinococcus granulosus* The hydatid cysts of this tapeworm happen to be of relatively enormous size, their significance was early appreciated following investigation many years ago The pattern of disease produced by this form of dog tapeworm was one of the first fully understood The nature of the condition was more easily appreciated than has been the case where the encysted form of any tapeworm assumes smaller proportions

The primary hosts of most tapeworms do not usually act as secondary hosts also *Tænia saginata* is the most commonly seen tapeworm lodged in man who acts as its primary host Cattle act most commonly as the secondary host for *T saginata* It is therefore in cattle that the secondary encysted stage of *T saginata* is noted This is sometimes referred to as hydatid disease of cattle or cysticercosis bovi these two are synonymous The *infestation rate of cattle* with *Cysticercus bovis* varies greatly from place to place in the same country and markedly so between different countries Perpetuation of *T saginata* infection is largely accounted for by the fact that some people like eating undercooked meat Some communities of the Eastern Mediterranean area reluctantly admit that they eat raw meat Adequate cooking of meat is the greatest safeguard against the spreading of infection In one of the main towns in West Africa it was a Public Health Regulation that no uncooked pork meat should be sold in the market This was a measure taken to eradicate *T solium*, the pig tapeworm

The encysted stage of *T saginata* in cattle is given by Silverman,[21] in 1956, as being from 0 5 to 3 per cent of cattle slaughtered in some of the large towns of the British Isles at controlled centres Griffiths,[7] writing on the same subject, gives an analysis of the infestation rate in carcasses of cattle found at the slaughter-houses of some of the large cities of Great Britain and Ireland These rates were Glasgow, 1 2 per cent , Dublin, 0 58 per cent , Edinburgh, 0 47 per cent , Birmingham, 0 28 per cent , Belfast, 0 23 per cent , average infection rate, 0 55 per cent approximately—1 in 200 carcasses were considered infected This small proportion of cattle infected is not likely to give rise to many cases of tapeworm The obviously infected carcasses were rejected but lesser infected carcasses may have been passed unnoticed In view of the extensive importation of meat from one country to another it is possible that an area where there is no known *T saginata* present may have the disease introduced Man does not seem to act as a secondary host to *T saginata* Hydatids, by self-infection, have not been recognised with this type of tapeworm, but it is possible that they may exist occasionally Man may act as the primary host of many other forms of tapeworm The broad tapeworm or *Dibothriocephalus latus* is found in man It is usually a tapeworm of dogs, cats and pigs The secondary host is usually of the fish class It is known to infect man most commonly by the eating of undercooked infected fish There are other less well known species of the Dibothriocephalus group—*Dibothriocephalus minus*, etc The identification of the various types of tapeworm infecting man is a matter for the experts in parasitology *Tænia solium* is normally a tapeworm of pigs, which act as the primary host Man may, however, also act as the primary host for this parasite It is this tapeworm which gives rise to the various manifestations of cysticercosis which is the encysted hydatid or secondary manifestation of *T solium* The importance of man acting as a primary and also as a secondary host for *T solium* should be appreciated Whether man develops cysticercosis as a result of ingesting the *T solium* ova from pigs or whether the *T solium* ova are ingested as an auto infection is a matter of conjecture The miniature tapeworm known as *Hymenolepis nana* has a very widespread distribution in the tropics and temperate areas of the world This minute tapeworm appears to have no intermediate host

and man may harbour the parasite in the small intestine, he also may harbour the encysted stage of this parasite The subject who is infected with *H nana* is liable to epileptiform convulsions The condition closely resembles cysticercosis or *T solium* in the encysted form Further forms of tapeworm have been described but are not so common The important thing to appreciate is that there is a definite pattern in tapeworm disease Primary tapeworm infestation can usually be treated adequately with various forms of medicine Most of the secondary or encysted forms require surgical treatment It is therefore of the utmost importance that those doctors undertaking surgical work should appreciate the importance of the pattern of tapeworm infection and constantly keep it in mind when confronted with unusual tumours or abnormalities manifesting themselves through the nervous system Hydatid disease without further qualification is usually taken to mean a manifestation of the encysted form of the tapeworm *Echinococcus granulosus* The primary host for this tapeworm form is the dog, though other animals also act as primary hosts The encysted form of this tapeworm is relatively enormous, considering that the primary worm is only about ½ to 1 in long—a very small tapeworm An increasing number of cases of this condition have been recognised in recent years in areas where it was previously not suspected

A very similar condition to hydatid disease due to *E granulosus* has been recognised in recent years in Africa, and this is a form of cyst formation due to another tapeworm of dogs and cats The tapeworm here concerned is termed 'Multiceps' and the small encysted hydatids formed in the secondary host are termed "coenurus cysts Raper and Dockery,"[3] working in East Africa, have recently described five cases of coenurus cysts in man These cysts are usually found about the head and neck, but may be noted elsewhere Two such cases have been personally encountered in West Africa On neither occasion was the condition accurately diagnosed before being removed In each case the patient presented himself with a painful cyst like condition about the neck The small painful mass appeared like a chronically inflamed gland in the posterior triangle of the neck On removing the small mass a cystic type of tumour was noted with grape like material contained in it With a low power lens minute hooklets were recognised in the jelly like mass There appeared to be several small loculi present Cannon [1] working in Nigeria, reported a similar case in 1942 Much interest is lost by young surgeons not having tumour tissues investigated at the central laboratories Many interesting conditions are not recognised or their significance fully appreciated Becker and Jacobson [25] have reported cases of *coenurus cysts* occurring within the brain giving rise to chronic headaches papilloedema, variable nerve symptoms and changes in the cerebrospinal fluid A space-occupying lesion was indicated in each case The patients had a history of close association with dogs in every instance One record has been found of a patient who developed a conjunctival tumour, and this, after removal, was dent fied [illegible] hough at the time

[illegible] representing the encysted form of *Taenia solium* The term, strictly speaking, might not necessarily

refer to this form of tapeworm, but *T solium* is usually implied when the term is used Gelfand[26] lays great stress, and rightly so, on the importance of *investigating all cases of epilepsy in African* patients for the encysted forms of tapeworm The term "idiopathic epilepsy" should be dropped, as it savours of an unhealthy degree of complacency and acceptance of the inevitable, when it is up to us to ascertain more precisely the pathology giving rise to the epilepsy Several *other forms of helminthic infection*, such as schistosomiasis and nematodosis and filariasis also give rise to epilepsy Gelfand[27] found in 2,184 post mortem examinations in East Africa seven cases where cysticercosis was present McArthur, working in India, brought this subject to prominence about *1925 when he detected several cases* of cysticercosis in soldiers serving in that country Cysticercosis as a cause of epilepsy may easily be suspected where there is evidence of calcified encysted tapeworm forms found elsewhere in the body than within the skull on radiological examination Calcified cysticercoids *can in many cases be found* in the muscles of the neck A case of this condition was reported in West Africa by Bowesman,[28] when a patient with a fracture of the right femur was found on examination of the X-ray photographs to have multiple calcified cysticercoids present in the muscles of the thigh Finding these, *he was X-rayed elsewhere and many further calcified cysts were found* Many cases of cysticercosis do not appear to have any symptoms at all and the condition is found incidentally on X-ray examination for other conditions Cases have been reported from the Indonesian area by Hausman[29] and Lie Kian-Joe[30] Gault[31] *working in India, found that 5 4 per cent of space-occupying brain lesions were* accounted for by this condition Carter[32] reports a case from Kenya, the patient, a child, having had attacks of Jacksonian epilepsy fits Africa and Cruz reported cases in the Philippine Islands in 1926 A further case was reported in 1954 by *Garduno and Icasiano*[33] *It is quite apparent from the many reports that* cysticercosis, although not a very common condition, is certainly very widespread The condition should be considered in all cases presenting cerebral symptoms Cerebral cysticercosis gives rise to the most serious signs of the disease because *of the lack of space for expansion within the rigid structure of the skull* A high proportion of cases of Japanese encephalitis B disease have been noted to have cerebral cysticercosis

The term "sparganosis" may be well known, but the presence of the *condition* is not well appreciated, other than in the Far Eastern areas of the world—Indo China, China, Formosa and Japan An increasing number of cases of this condition have been recognised recently from non-Asiatic countries This condition is a further example of a metastatic form of tapeworm disease It is very comparable to cysticercosis or the hydatid group, but the manifestation is less well localised Sparganosis appears as a localised muscle abscess or inflammatory tissue mass elsewhere It is not well encysted Two cases of sparganosis have been seen in West Africa In one case an abscess of the right thigh was opened and found to contain a small tapeworm About ten years later a further case was encountered In the second instance an abscess of the abdominal wall was found to contain a short tapeworm The worm was found on examination to have apparently only one segment, but on closer examination

and man may harbour the parasite in the small intestine, he also may harbour the encysted stage of this parasite The subject who is infected with *H nana* is liable to epileptiform convulsions The condition closely resembles cysticercosis or *T solium* in the encysted form Further forms of tapeworm have been described but are not so common The important thing to appreciate is that there is a definite pattern in tapeworm disease Primary tapeworm infestation can usually be treated adequately with various forms of medicine Most of the secondary or encysted forms require surgical treatment It is therefore of the utmost importance that those doctors undertaking surgical work should appreciate the importance of the pattern of tapeworm infection and constantly keep it in mind when confronted with unusual tumours or abnormalities manifesting themselves through the nervous system Hydatid disease without further qualification is usually taken to mean a manifestation of the encysted form of the tapeworm *Echinococcus granulosus* The primary host for this tapeworm form is the dog, though other animals also act as primary hosts The encysted form of this tapeworm is relatively enormous, considering that the primary worm is only about ¼ to 1 in long—a very small tapeworm An increasing number of cases of this condition have been recognised in recent years in areas where it was previously not suspected

A very similar condition to hydatid disease due to *E granulosus* has been recognised in recent years in Africa, and this is a form of cyst formation due to another tapeworm of dogs and cats The tapeworm here concerned is termed "Multiceps" and the small encysted hydatids formed in the secondary host are termed "coenurus cysts" Raper and Dockery,[23] working in East Africa, have recently described five cases of coenurus cysts in man These cysts are usually found about the head and neck, but may be noted elsewhere Two such cases have been personally encountered in West Africa On neither occasion was the condition accurately diagnosed before being removed In each case the patient presented himself with a painful cyst-like condition about the neck The small painful mass appeared like a chronically inflamed gland in the posterior triangle of the neck On removing the small mass a cystic type of tumour was noted with grape-like material contained in it With a low-power lens minute hooklets were recognised in the jelly-like mass There appeared to be several small loculi present Cannon,[24] working in Nigeria, reported a similar case in 1942 Much interest is lost by young surgeons not having tumour tissues investigated at the central laboratories Many interesting conditions are not recognised or their significance fully appreciated Becker and Jacobson [25] have reported cases of coenurus cysts occurring within the brain giving rise to chronic headaches, papillœdema, variable nerve symptoms and changes in the cerebrospinal fluid A space-occupying lesion was indicated in each case The patients had a history of close association with dogs in every instance One record has been found of a patient who developed a conjunctival tumour, and this, after removal, was [illegible] hough at the time

[illegible] representing the encysted form of *Tænia solium* The term, strictly speaking, might not necessarily

The magnitude of the problem of hydatid disease, and the importance i assumes in many countries, will be appreciated when it is known that there is an International Society of Hydatology, formed by medical communities interested in the subject The annual meeting of this society was held at Algiers in 1952 Some interesting facts were given in the report subsequently issued [37] Hydatid disease is very common in Spain amongst the shepherds of the Castile and Aragon areas In Greece, 590 hydatid cases were recognised in one year in a total population of 8 million Uruguay in South America, Cyprus and the Balkan States all have a high incidence of the disease In Yugoslavia there were 2,502 cases of hydatid disease recognised in seventeen years between 1930 and 1947 The prevalence of the condition appears to be greatest in countries where the temperature range is between 10° and 20° C In North Africa there is an increasing incidence of the condition from Algiers going east to Tunisia In Iceland the condition was at one time quite common It has been almost completely eradicated by the improving education of the population The imposition of a dog tax and the control of stray dogs have all helped to reduce the incidence of the condition Several authorities lay stress on the importance, in liver hydatid operations, of closing the cavity in the liver after removal of the cyst For this purpose a large fatty graft of omental tissue can be used The mesentery seems to have some hæmostatic action as well as being a bulky material with an adequate blood supply It is suitable for closing the large opening which remains following the removal of the cyst In North Africa and South Africa hydatid disease is definitely quite common Helman [38] notes the frequency of the condition in South-West Africa The tropical belt of Africa is certainly less suitable for the continued existence of this disease than is North or South Africa Although hydatid disease is not very common within the tropical belt of Africa, Snell and Mukasa [39] report a case of the condition in Uganda

Whereas any of the abdominal organs may become infected with hydatid disease, the liver is most frequently affected, this might reasonably be expected, keeping in mind the general pattern of tapeworm disease, the infected material causing the disease being ingested and the embryonic forms of the parasite entering via the gut and thence through the portal circulation to the liver Embryos pass through the hepatic circulation and thence reach the vena cava and so the infection reaches the lungs The lungs are therefore the second most likely site for hydatid disease After this the embryos are carried to all parts of the body, accounting for hydatids in various parts The brain is not infrequently affected Brain hydatids produce symptoms early Arana-Iniguez [40] comments on the frequency with which hydatid disease of the brain occurs in children as opposed to adults The condition is almost invariably found in children under the age of 12 years Throughout the Mediterranean area the number of cases is relatively large

Pipkin, Rizk and Balakian [41] state that the infestation rate of hydatid disease in animals in Jerusalem is as follows Dogs, 30 per cent infected, cows, 47 per cent, sheep, 20 per cent, camels, 67 per cent With such a high infestation rate in cattle and sheep, and the frequency with which inadequately cooked meat

was noted to have one large segment and about three very minute segments in front of the large segment Alves, Gelfand and Weinberg[34] report a case of sparganosis in an African patient from Portuguese East Africa Previous cases had been reported from the same area Sparganosis was first described by Manson in 1881 in China Weinstein, Krawczyk and Peers[35] report a case from Korea Two cases were reported by Kiremerwa, Byaruhanga and Raper,[36] working in East Africa The tapeworm concerned is usually a tapeworm of cats or dogs, and the intermediate stage is developed in frogs, fish and snakes The practice of eating fish raw in Japan is not at all unusual amongst rich and poor A cyclops flea is also considered to act as a link in the life cycle In Indo-China the condition is well known, and it is considered that the disease is caused by eating sparganoid flesh of fish or frogs The peculiar practice of poulticing boils with killed frog meat has been suggested as a possible method of spread of this condition A case is described[36] where a tumour was dissected off the surface of the colon containing a mass of granulation tissue, and within this mass a tapeworm about 6 in long was found To diagnose such a condition would appear to be quite impossible The remote possibility that any unusual small tumour or inflammatory mass may be caused by some encysted form of tapeworm should be appreciated

The subject of hydatid disease due to *Echinococcus granulosus* is of considerable magnitude Without personal experience of the condition it would be unfair to suggest what might be done in individual cases of this condition The only case encountered was in a Lebanese patient who died suddenly On post-mortem examination it was found that he had ruptured a hydatid cyst of the liver into the inferior vena cava

An opportunity was afforded during holidays of watching operations undertaken in South Africa on patients suffering from hydatid cysts Most of the cases dealt with were situated within the abdominal cavity The hopelessness of many of these cases was depressing When these cysts become large, giving rise to obstruction of various structures, the outlook is invariably very poor When hydatid cysts are small they seem to be very silent, giving rise to few symptoms they sometimes become calcified and no further trouble is encountered Whether all cases should be operated upon is very doubtful indeed probably a large number are better left alone A hydatid cyst discovered incidentally and of small size needs to be considered very carefully as to the best mode of dealing with it The comments here given are offered with apologies in view of the absence of personal experience of hydatid disease, having only watched operations for hydatid disease it is not possible to speak with authority It was an extraordinary experience seeing for the first time the large daughter cysts of egg like appearance coming out of the main cavity These secondary cysts looked like hens' eggs without a shell (unoperculated) of variable size As some of them fell on the floor they jumped a bit In several cases the main hydatid cyst was well covered in a dense mass of adhesions, and it looked as though it would have been quite impossible to make an accurate dissection with complete removal of the cyst Practically all cases seen at operation were considered, on opening the abdomen, to be inoperable

hot packs alone Omentum subsequently sutured loosely to the raw area, using atraumatic needles, is in most cases adequate in dealing with what at first might be thought to be a very alarming situation

Last but not of least importance is consideration of the work of Fitzpatrick,[45] working in Australia, also Reay and Rolleston [46] from the same area These latter workers describe two cases of hydatid cyst of the renal cortex which encroached on the pelvis of the ureter and ruptured into that structure and so were evacuated with the urinary outflow Hydatid material was recognised in the urine Hydatids of the kidney are usually said to be situated in the periphery of the organ Fitzpatrick,[47] with an interest primarily in pulmonary surgery, lists the complications noted in eighty cases of lung hydatid disease following operation as being anaphylactic shock, where spilling of hydatid fluid occurs, and persistence of the lung cavity following removal of the cyst, with the development of infection and empyema Recurrence with daughter cyst formation, due to spilling of infected hydatid fluid, occurred on a small number of occasions Fibrosis and bronchiectasis may occur in some cases Four deaths occurred in eighty cases operated upon—a mortality of 5 per cent , this is a remarkably good achievement, considering the gravity of the disease treated

Fitzpatrick,[45] in a discussion of the method of removal of the cyst in lung cases, lays emphasis on the following points Successful removal of a hydatid cyst depends on getting out the cyst complete without spilling any hydatid fluid New cysts will grow if released scolices are contained in the fluid spilled On removing hydatid fluid from the cyst and shaking it up in a container it was found that it takes only sixty seconds for the scolices to settle to the bottom of the container This is a simple but important observation The scolices are lightly attached to the cyst wall and may be separated by rough handling , if, however, they are separated and a sufficient time interval is allowed, they will sediment to the bottom of the cyst cavity The ideal in treatment is the removal of the complete cyst with the adventitious capsule included Splitting of the adventitious capsule and removal of the cyst unbroken can be done, but there is considerable possibility of rupture of the cyst wall, with spilling of hydatid fluid containing scolices If it is not possible to remove the cyst with the adventitious capsule complete, it is advised that the adventitious capsule be split and the fluid allowed to settle a while After two minutes has elapsed some fluid is aspirated from the cyst , by so doing with a small-bored needle a considerable amount of fluid can be removed and the cyst is *much less likely to burst With the negative pressure* inside the cyst and gentle handling, the cyst may frequently be removed without spilling of infected fluid The aspiration of fluid with a strong pull in the syringe produces this negative pressure in the cyst and the escape of fluid is less likely

Analysing three series of cases operated upon, with reference to the number of cases in which the cyst was removed intact with no spilling of fluid, and those in which some escape of fluid occurred, it was noted that in twenty-two cases (Barrett and Thomas),[48] seventeen were removed complete with no spilling , in five, fluid was spilled In a series of forty-nine cases, also by Barrett and Thomas, forty-three were aspirated in six there was fluid overflow with recurrence

is eaten, it is not to be wondered at that there is a continuance of the infection in man Reference to the disease in India has been made by Devi,[42] working in Nagpur, he reports two cases of hydatid disease in the pelvis of female patients One patient suffered from an obstructed labour due to hydatid disease in the pelvis The other patient was considered likely to have an ovarian cyst but was found at laparotomy to be suffering from hydatid disease In each case the cysts detected were found to be secondary to further cysts in the upper abdomen The presence of multiple hydatid cysts is found to be very common, this is a point which must always be remembered in considering treatment Trivedi,[43] working in Calcutta, found that 2 per cent of the dogs in that city were infected with tapeworm Twelve cases of lung hydatid disease were noted in Calcutta in thirty-one years The condition is therefore not very common As opposed to the relatively low infestation rate of dogs with tapeworm in Calcutta (2 per cent) it is found that in Melbourne in Australia almost 100 per cent of the dogs are infected with tapeworm Hydatid disease is a comparatively common condition in parts of Australia

In surveying the literature from various parts of the world the Russian surgical journal *Khirurgiya* was consulted on the subject of hydatid disease Bregadzie,[44] working in West Siberia, made the following observations on liver hydatids He noted fifty cases of hydatid disease of the liver in three years In forty six of the patients the cysts were multiple, a solitary cyst was found in only four cases These are most important observations The distribution of the four solitary liver cysts was three patients, each with a cyst in the left lobe of the liver, and the remaining patient with a solitary cyst in the right lobe He advised that if the cyst is in the left lobe of the liver and single, a lobectomy should be done This operation is usually possible with a single cyst on the left side A solitary cyst on the right side is not usually so easy to deal with, as it is more frequently complicated by involvement of important structures If a lobectomy is undertaken on the right side it may necessitate an anastomosis between the bowel and the liver direct, as in many cases the continuity of the bile ducts is interfered with The operative risks involved in such a procedure would be associated with a very high mortality rate

Bregadzie considers that laparotomy should be avoided if at all possible in dealing with cysts of the liver The peritoneal cavity should not be opened A direct approach through the lower region of the thoracic wall is to be preferred Total removal of the cyst should be attempted if at all possible, the alternative is the injection of the cyst with formaldehyde to kill the scolices and remove the cyst bit by bit If an approach is made through the peritoneal cavity, in the form of a laparotomy, one of the few advantages gained is that hæmorrhage may be arrested by the use of an omental plug The use of powdered thrombin to control hæmorrhage is also given consideration Contrary to what might be imagined, a liver lobectomy carried out with the use of a diathermy does not give rise to nearly so much hæmorrhage Having carried out this operation on a few occasions for conditions other than hydatids, the results were agreeably surprising It is not unduly difficult to arrest the hæmorrhage The large hepatic veins initilay bleed profusely, but much of the bleeding stops with the use of

treatment, twelve tapeworm heads were found in the specimen passed After finding the twelve heads, the search was given up—there may have been more The patient was certainly improved by the treatment if not cured

Feng [50] advocates the use of melon seed and areca nut in the treatment of tapeworm with 99 per cent success An extract of the method is appended This method has been used in Europe in the past, but during the war it was difficult to get areca nuts (betel nuts), so pulv arecæ was removed from the pharmacopœia in 1940 The method might be revived with advantage considering its efficiency

OTHER WORM PARASITES

In view of the extensive pathology associated with schistosomiasis a special section is being devoted to the consideration of the Schistosome group of diseases Paragonimus, another trematode worm found most commonly in the lower respiratory tract, will be dealt with under diseases of that area of the body The filarial diseases, with the surgery of complications of filaria, the elephantoid conditions, are also collected together in one chapter In view of the enormous number and variety of animals and reptiles in the world and the various other forms of life which are heavily parasitised and with which man comes in contact, it can well be understood what a vast number of possible infections might be contracted sporadically It is necessary to be vigilant and have constant regard *for the possibility of such infection taking place Having dissected lizards which* are seen so commonly about the wooden floors of tropical bungalows, and seeing the degree of infestation by intestinal worms which exist in them, it is surprising that no records appear to have been made of infection in man by the parasitic worms of lizards It would not be surprising, in fact, to find that man is infected by intestinal parasites from this source

The whipworm or *Trichuris trichuria is a worm about 2 in long* Its primary location is in the large gut of man, particularly the cæcum This worm [illegible] This
ate
nt

Marked anæmia is produced in some cases when a heavy infection is present In this respect the clinical features bear some resemblance to ankylostomiasis The anæmia produced by this parasite was very apparent in a case seen in student days when a massive infection of this type of worm was detected in a small child The child's hæmoglobin level dropped to about 25 per cent The onset was gradual and there was no other cause found for the anæmia The child was very ill Following treatment he improved rapidly Following infection with this parasite the larvæ developing from the ingested eggs enter the blood stream, and therefore it follows the pattern of worm infections where blood stream contamination is found Abscess of the liver as well as pulmonary complications due to this parasite have been noted in India

Treatment is as for ankylostomiasis, using a saline aperient followed by castor oil and oil of chenopodium, with a subsequent saline aperient, this appears to expel this worm, as seen in actual cases treated Piperazine preparations also are found

Fitzpatrick quotes eighty seven cases in a series in eighty there was no spilling of fluid, but in seven cases there was some loss with recurrence of the disease To ensure success in these cases it is essential to —

1 Control respiration to eliminate movement when required
2 Allow two minutes after exposure for scolices to settle before aspiration
3 Remove sufficient fluid to produce a negative pressure within the sack
4 Do not damage the cyst wall at any other point while getting it out
5 Lift out the partially emptied cyst after separation is complete

From the above remarks it will be understood that the majority of tapeworm conditions, certainly those of the secondary type, are of a surgical nature regarding treatment Every care is necessary in order to deal with these serious complications of tapeworm disease, and there is much opportunity when cases are encountered for exercise of meticulous and careful technique in order to attain a good result

The rupture of a pulmonary hydatid into a main bronchus is a very serious complication It is followed by an extension of the disease by dissemination of the scolices The use of Cassoni's fluid may be helpful in diagnosis by intradermal skin testing

The treatment of tapeworm in the intestinal tract of the primary host can be undertaken by several methods Treatment in hospital, if at all possible, is preferable to giving treatment to an out-patient It is very difficult to get most patients to refrain from taking food for twenty-four hours, as is necessary to ensure success A preliminary aperient of the saline type is given in the afternoon The patient is taken off all food and allowed to take water only for twenty-four hours The next morning the patient is given 1 dram of liquid extract of filix mas in mucilage Two hours later a further dram of liquid extract of filix-mas is again given in mucilage Three hours after this a large saline aperient is given Such a dosage is suitable for an adult patient weighing 10 stone or more Somewhat smaller doses may be given to other patients of a lighter body weight Children should be given quarter doses or half doses, depending on their age and weight

Tapeworm in young children has been noted in very few instances, but it may occur It should be remembered that many of the cysticercosis cases and coenurus cyst cases were in children Treatment with liquid extract of filix mas is usually successful in about 75 per cent of the cases treated in hospital, but not more than 50 per cent successful if given to out-patients McKinnon,[20] working in East Africa, has had very satisfactory results using mepacrine in treatment 0 8 gm of mepacrine (eight 0 1 gm tablets), two tablets are taken every five minutes for four doses Two hours later a large saline aperient is given With one such treatment there was a clearance rate of 80 per cent With two treatments the success rate was 90 per cent The object of giving the mepacrine in divided doses was to decrease the risk of vomiting An alkaline mixture should be given with the mepacrine, as it is otherwise a little likely to cause some gastritis Seaton,[49] using the same method approximately, also reported good results Following treatment, the head of the tapeworm should be identified if possible The fact that the head is found following treatment is satisfactory but may not necessarily ensure that a cure has been achieved On one occasion following

should be looked for in cases where other signs suggest this illness The eosinophilia increases to 75 per cent in some cases

In areas where the incidence of the disease is high or rising on the previous level it might be reasonable to insist on the cooking of all pork meat before it is sold, as is done in some areas, because of the risk of cysticercosis From time to time inflammatory lesions are reported where the cause is considered to be some form of parasitic worm Chang[53] reports a case of uveitis in a Cantonese patient in China A nematode parasitic worm was found in the uveal tract of the eye It was found to be of the type *Gnathostoma spinigerum* This nematode worm is normally a parasitic worm of the feline group of animals—tigers and smaller felines Fish act as an intermediate host and infections in humans may be contracted by eating undercooked fish which are infected It is apparently not a common condition, but it is mentioned in view of the fact that so many types of worm may give rise to inflammatory lesions, and it is wise on all occasions in surgical practice in the tropics to ascertain the cause of any illness It may be found that many inflammatory conditions are due to some parasitic worms which are not yet well known

On rare occasions patients may be noted to pass the larval maggots of certain flies in motions The term " intestinal myiasis " is given to this condition It is associated with abdominal pain and abdominal distension with wind The few cases seen personally have been in children Doubt has been cast on the existence of such a condition, but it certainly exists, and the maggots are noted immediately the motions are passed and when no larviparous flies are present Micks and McKibben,[51] as well as other writers, have described the condition They suggest the use of Cristoids, that is, hexylresorcinal, in treatment The condition is self limiting and stops soon after the patient ceases to take food contaminated by the ova of flies of which the maggots represent the embryonic stage

EXTRACTS

1 ' Parasitic Invasion of the Biliary Tract Liang Shu Fang *Chin med J*, 1957, 75, 418

(1) Shanghai infestation with ascaris worms is 23 8 per cent , clonorcis, 0 023 per cent
(2)
(3)
(4)
(5) water put into duodenum by tube (difficult to swallow tube post operatively)

2 Oxygen Treatment of Ascariasis ' F F Talyzin (Moscow) *Lancet*, 1954, 2 314

The method first described by Kravetz

(1) Enema before breakfast
(2) Pass duodenal tube per nose to stomach
[illegible] fifteen minutes

(9) Gas is absorbed, not passed per rectum
(10) Worms passed *dead* two to three days later

effective in dislodging this parasite This latter drug has not been tried on personal cases The use of hydrogen peroxide added to an enema has been advocated with apparently good results It would be of considerable interest to see if the parasite could be expelled by oxygen given per rectum, comparable to the intragastric treatment for ascariasis advocated by Kravetz

Trichinella spiralis is a small thread like parasite about ½ cm long It is *much smaller than Oxyuris vermicularis This worm is quite a dangerous form* of intestinal parasite The embryos tend to enter the circulation and be distributed to all parts of the body Patients infected with this worm suffer from an acute fulminating illness, with high fever, marked muscle pains and severe headache The patient is extremely ill and there is a rapid loss of weight The condition may be confused with an attack of poliomyelitis This parasite is one of the few worms which make patients acutely ill Drury [51] gave a good description of trichiniasis, having noted a small outbreak of this condition recently in the south of Ireland The infection was contracted by eating inadequately cooked pork *T spiralis* is normally a nematode worm of pigs It not infrequently infects man Soon after entering the body the larvæ enter the blood stream and become localised in the muscles and the nervous system Diagnosis is often difficult Localised outbreaks of this disease tend to occur sporadically It was at one time relatively common in parts of the Continent of Europe During the past ten years there has been a marked increase in the condition in America, where the infestation rate has been found to be as high as 16 per cent in some areas This is a very high infestation rate with a condition which might be classed as a dangerous disease Some patients die during the acute phase of the illness most patients infected are acutely ill No articles have been noted indicating the presence of the disease in tropical areas Manson Bahr [52] mentions the occurrence of trichiniasis in China, India, Algiers and East Africa In a small number of patients in West Africa where the condition was suspected, muscle biopsies were undertaken, but the results were reported negative In the case of any worm parasite where the larvæ enter the blood stream, serious complications may occur The liver, lung and central nervous system are the areas where complications are much the most serious The severe headache associated with the acute stage of trichiniasis are caused by larvæ entering the central nervous system, with resultant cerebral congestion Trichiniasis of the central nervous system has been reported, and it is obviously a very serious condition Patients who recover from the acute phase of the illness subsequently suffer from chronic ill health as a result of the muscle infestation by the encysted forms of the parasite Oxytetracycline drugs are an advantage in treatment of the condition It is, however, difficult to make an accurate initial diagnosis The condition may be suspected in endemic areas, but it is difficult to prove at the early stage Confirmation of diagnosis by muscle biopsy can only be undertaken in the later stages Some cases are diagnosed *post mortem* only It appears that the optimum site for finding the encysted stage of this parasite is in the muscle tissue of the diaphragm Biopsy during life for diagnostic purposes must be undertaken in a more accessible site The pectoral muscle is the usual area to choose for biopsy A very high eosinophilia in the blood during the acute stage is strongly suggestive of the condition and

Pumpkin seed seems to soften the body of the tapeworm Areca nut essential for removal of the head Both materials essential for success Pumpkin seeds not toxic at all, can be eaten as food in any amount Prepare areca nut by boiling 80 gm in 500 c c of water for one hour, the nut being sliced This is then filtered To remove tannin from this, which is irritating to the stomach, 2 5 per cent gelatine solution is added, a precipitate is formed Filter and reduce the volume to about 200 c c again The 200 c c is then taken as the dose of areca nut, equivalent to 80 gm of the original product

Very interesting article The method was compared as against atebrin and thought to be much superior to atebrin in the treatment of tapeworm Official dose of prepared pulv arecæ (B P, 1940), 15 to60 gr This preparation is betel nut The pulv contains 15 per cent tannin

REFERENCES

1 VENKATACHALAM, P S & PATWARDHAN, V N (1953) The role of *Ascaris lumbricoides* in the nutrition of the host *Trans roy Soc trop Med Hyg* 47, 169

2 BROWNE, S G (1954) Nematodosis of the central nervous system *J trop Med Hyg* 57, 229

3 PRESTON, P G (1942) Six years' maternity work amongst the Wakikuyu *E Afr med J* 19, 223

4 FAIN, A *et al* (1957) Description d un nouveau distome vivant dans absces retro-auriculares *Ann Soc belge Méd trop* 37, 251

5 OKPALA, I (1956) The incidence of intestinal parasites amongst school children in Lagos *W Afr med J* 5, 167

6 LIANG SHU FANG (1957) Parasitic invasion of the biliary tract *Chin med J* 75, 418

7 MAKIDONO, J (1956) Observations on ascaris during fluoroscopy *Amer J trop Med Hyg* 5, 699

8 [illegible] e to ascariasis *E Afr med J* 30, 251

A tumour mass due to ascaris larvæ *Trans*

1 Helminthic abscess a surgical complication

11 *WANG, HSUN CHIUNG et al (1956) Biliary ascariasis an analysis of 141 cases Chin med J* 74, 445

12 WOLF, J (1956) Patent omphalomesenteric duct with *Ascaris lumbricoides* infestation *J trop Med* 59, 314

13 YEH, L -S & JORDAN, P (1957) On a new Gordiid worm parasitic in man *Ann trop Med Parasit* 51, 313

14 OCAMPO, A N (1957) Hepatic abscess of liver due to ascaris worms *J Philipp med Ass* 33, 607

15 WINCKEL, W E F & TREURNIET, A E (1956) Infestation with *Lagochilascaris minor* in man *Docum Med geogr trop (Amst)* 8, 23

16 ATCHLEY, F O, WYSHAM, D N & HEMPIL, E C (1956) Mass treatment of ascariasis with single dose of piperazine citrate *Amer J trop Med Hyg* 5, 881

17 TALYZIN, F F (1954) Oxygen treatment of ascariasis *Lancet*, 2, 314

18 VORA, D (1955) A comparative study of anthelminthic action of santonin and intragastric oxygen *Indian J med Sci* 9, 573

19 KANZLER, R W (1957)

20 *MCKINNON, J A (1957)*

21 SILVERMAN, P H (1955)

22 GRIFFITHS, R B (1950)

Ann trop Med Parasit 44 357

23 RAPER, A B & DOCKERY, G C (1956) Coenurus cysts in man five cases from East Africa. *Ann trop Med Parasit* 50, 121

24 CANNON, D A (1942) A case of human infection with species of coenurus *Ann trop Med Parasit* 36, 32

25 BECKER, B J P & JACOBSON, S (1951) Infestation of the human brain with *Coenurus cerebralis* *Lancet*, 11, 198

26 GELFAND, M (1957) Epilepsy in the African *Cent Afr J Med* 3 11

27 *GELFAND, M (1948)* Cysticercosis of the brain in the African in Rhodesia *E Afr med J* 25, 110

23 BOWESMAN, C (1952) Cysticercosis in West Africa *Ann trop Med Parasit* 46, 101

Equipment

Abdomen initially distended a l ttle later absorbs Not uncomfortable Blood pressure—no change Pulse slows a bit Worms noted to be dead when passed eggs do not hatch being killed also

Ascariasis Intragastric Oxygen Therapy

To measure the gas required you can either use wa er d splacement from bottles as in a pneumothorax apparatus or use a circular balloon The diameter measurement corresponding to requ red volumes w ll be found useful

Spherical balloon volume ½ litre	9 8 cm diameter
Spherical balloon volume 1 litre	12 4 cm diameter
Spherical balloon volume 1½ litres	14 2 cm diameter
Spherical balloon volume 2 l tres	15 6 cm diameter
Spherical balloon volume 2½ litres	16 8 cm diameter

$$\text{Formula for volume} \quad \frac{3\ 14}{6} \times \text{diam}^3$$

This measurement can easily be marked by two uprights on a ruler or br cks if necessary and the balloon blown up between them unt l it touches the bricks If the method is likely to be used frequently a proper slide attachment can easily be fitted to an upright as used for measuring a pat ent s foot in a shoe shop

3 Coenurus Cysts in Man Five Cases from East Africa A B Raper and G C Dockery *Ann trop Med Para t* 1956 50 121

Cysts occurred in children and adults This is the larval stage of a tapeworm of carnivorous animals cat and dog (very comparable to hydatid disease)

Cases have been reported from South Africa East Africa and West Africa West African cases reported by D A Cannon from Niger a (*Ann trop Med Paras t* 194? 36 32)

[illegible]

Cases have been reported in various s tes—muscles chest wall neck about the eye under conjunctiva in the nervous system brain etc Not a common cond tion but will never be recognised unless appreciated The tapeworm involved is of the species Multiceps The hooklets can be found in the cysts

4 A Case of Sparganosis in an African from Portuguese East Africa W D Alves M Gelfand and R Weinberg *Trans roy Soc trop Med Hyg* 1954 48 87

Previously reported in East Africa in 1907 and another case in 1943 (de Meilen and Leed)

Symptoms intermittent pain and s velling of the right leg Nodules felt in abdominal wall which on b opsy showed sparganos s Pain swelling and itchiness locally and a feeling of something moving in the lump seem to be the chief characters Some low fever

5 The Combined Use of Pumpkin Seed and Areca Nut in the Treatment of Tapeworm L C Feng *Chin med J* 1956 74 17

Ninety n ne per cent cure achieved with a combination of these two vegetable nuts

DOSAGE

	Pumpkin Seeds	Areca Nut
Adult	Decorticated 50 gm	80 gm two hours later
Child	Decorticated half dose	Half dose

(Mag sulph three hours later)

6

Operative Approach

THERE are many excellent textbooks written on the subject of operative technique It is proposed here to indicate only a few points which require some emphasis relative to the approach to surgery in the tropics This aspect of the subject is rather different from technique *per se* The difficulty of maintaining an adequate supply of material suitable for surgical work in the tropics, in remote stations, may be quite a problem In the majority of country district hospitals one doctor alone is responsible for all branches of the work Very limited skilled assistance is available in many instances Under these circumstances it is necessary to give more precise instructions regarding treatment ordered Instructions should be definite, precise and given in writing when possible Brief written instructions ultimately save time and misunderstanding

PRE-OPERATIVE PREPARATION

A very broad or a very limited interpretation may be put on the term "pre-operative preparation" The initial decision of any patient to seek advice, and if necessary operative treatment, for any complaint is the initial stage in pre-operative preparation A patient having come to hospital and been examined for the condition for which he seeks treatment must be advised regarding the most suitable time for operation Already consideration has been given to the matter of nutrition relative to surgery This is an important and necessary part in the pre-operative preparation of a patient The more limited aspect of pre-operative preparation starts with the admission of the patient to hospital It is inadvisable to admit patients to hospital and operate on them the same day in non-urgent cases The optimum time for pre-operative rest and preparation in hospital is two days This period is sufficient for patients to get to know the staff, have adequate rest, and learn the routine of hospital life During this short time they get to know other patients in near-by beds, these are small points but quite important Patients are much happier in hospital if they have those near them with whom they can make friends easily A little adjustment of the beds in the wards can be undertaken by the nursing staff with advantage

Whereas clinical notes of the complaints and physical examination of the patient are made at the time of the first examination in the out patient department, it is desirable to re-examine all patients at least once in hospital before operation the patient's condition may have altered considerably between the time he was seen in the out-patient department and his admission to hospital Further clinical and laboratory examinations may have to be undertaken prior to operation Patients should be given definite instructions in the out-patient department as to

29 HAUSMAN, R. (1950) A case of cysticercosis with some notes on tæniasis in Indonesia *Docum neerl indones Morb trop* 2, 59
30 LIE KIAN-JOE (1955) A case of cysticercosis in Indonesia *Docum Med geogr trop (Amst)* 7, 134
31 GAULT, E W (1953) Intracranial space occupying lesions *Indian J med Sci* 7, 455
32 CARTER, F S (1954) Cerebral cysticercosis *E Afr med J* 30, 295
33 GARDUNO, D M & ICASIANO, C B (1954) A case of human cysticercosis (*T solium*). *J Philipp med Ass* 30, 572
34 ALVES, W D, GELFAND, M & WEINBERG, R (1954) A case of sparganosis in an African from Portuguese East Africa *Trans roy Soc trop Med Hyg* 48, 87
35 WEINSTEIN, P P, KRAWCZYK, H J & PEERS, J H (1954) Sparganosis in Korea *Amer J trop Med Hyg* 3, 112
36 KIREMERWA, D N, BYARUHANGA, D B & RAPER, A B (1956) Sparganosis with report of two cases *E Afr med J* 33, 37
37 Foreign Letters (1952) Hydatid disease *J Amer med Ass* 148 (1), 305
38 HELMAN, J (1957) Some diseases amongst the Hottentots of South-west Africa *Cent Afr J Med* 3, 143
39 SNELL, D G & MUKASA, S K B (1948) A case of hydatid disease of the liver *E Afr med J* 25, 288
40 ARANA INIGUEZ, R (1955) Hydatid cysts of brain *J Neurosurg* 12, 323
41 PIPKIN, A C, RIZK, R & BALAKIAN, G P (1951) Echinococcus in the Near East and its occurrence in animal hosts *Trans roy Soc trop Med Hyg* 45, 253
42 DEVI, P K (1956) Two cases of hydatid cysts in the pelvis *J Obstet Gynaec India*, 6, 203
43 TRIVEDI, B P (1952) Hydatid disease of the lungs *Indian J med Sci* 6, 591
44 BREGADZIE, I L (1957) Surgical intervention in alveolar echinococcus of the liver *Khirurgiya (U S S R)*, 3, 26
45 FITZPATRICK, S C (1954-55) The sedimentation of hydatid scolices *Aust N Z J Surg* 24, 109
46 REAY, E R & ROLLESTON, G L (1952-53) Hydatid cyst of kidney *Aust N Z J Surg* 22, 268
47 FITZPATRICK, S C (1950-51) Sequelæ of treatment of hydatic cysts of the lung *Aust N Z J Surg* 20, 278
48 [illegible]

67, 166
54 MICKS, D W & MCKIBBEN, J W (1956) Case of human intestinal myiasis *Amer J trop Med Hyg* 5, 929

and inadequate sterilisation In one large station where such a plant was in operation it was noted that some cases became infected and the drum sterilisation system was suspected of being at fault On examining the charts produced by the apparatus it was noted that the pressure had been raised to the required level but not maintained, it was allowed to drop immediately The pressure should have been maintained for fifteen minutes, then allowed to drop down to the external pressure, and when this point was reached, raised a second time to the required pressure and temperature for a further fifteen minutes The pressure is finally let off slowly before removal of the drums The whole sterilisation process took not less than one hour for each batch of drums sterilised On seeking an explanation from the one responsible for the sterilisation it was maintained that it was not possible to sterilise so many drums as were being sent for sterilisation in the time available The pressure was therefore brought up to the top level as required but let off immediately, the drums were then removed This technique did not sterilise the drums, it necessitates constant vigilance to attend to all the points necessary to maintain an aseptic regime at all stages

During an inspection tour of country stations, on one occasion it was found that at four out of five of the stations visited the technique of sterilisation carried out was not adequate to attain good surgical results In four stations out of the five the sterilisers were defective, but this had not been detected In such circumstances it is little wonder that the impression is gained that cases go septic more easily in the tropics than in temperate climates

It may not always be easy to check the efficiency of a steriliser The use of Brown's colour indicator tubes is easy and efficient These indicators are put into the centre of a drum containing dressings, and when the temperature has been raised to the proper level a colour change occurs in the fluid contained in the glass tube It is not always easy in remote places to maintain a stock of these tubes A very simple, efficient and practical method which can be used in any part of the world is here suggested If a fresh hen's egg is placed in the centre of the dressings in the middle of the drum and the routine of sterilisation employed in the hospital is carried out, it will be found that if the temperature reaching the

which was thought to be faulty, although the gauge appeared to show adequate pressure registration and temperature level, but on removing the egg it was found to be completely uncooked The steriliser was obviously at fault and the fault was subsequently detected by the engineers who dismantled the steriliser This simple test is very well worth remembering, especially for those working in places where little technical assistance is available

Regarding the pre operative skin preparation of patients, methods vary considerably from place to place Doctors have their particular likes and dislikes regarding the methods used If gross infection is present close to the site of the anticipated operation it is usually necessary to defer the operation A local boil or other skin infection may be present Bathing, shaving and skin preparation of patients should be undertaken the day before operation, on that occasion, however,

preliminary preparation prior to entering the hospital All surgical patients should be instructed to shave pubic hair before admission Male patients can with advantage have their hair cut, this makes them more comfortable while in hospital Attention to the manicuring of nails is highly desirable The popular habit in some areas of the tropics of retaining one finger nail long for the purpose of scratching various parts of the body is surgically undesirable All nails should be cut short and the hands properly scrubbed and washed Some patients may refuse to have this long nail cut short—patients, however, seldom refuse if the doctor insists that the nail must be cut short A bacteriological examination has been made from many such nails cut off and it is found that the predominant organisms found are coagulase-negative staphylococci and *Bacillus coli* Many other types of organism may exist in the debris contained in these nails such an obvious source of infection should certainly be removed Patients are very liable to scratch a surgical wound under the bandages when it becomes a bit irritant during the early stages of healing To have a long infected nail of this type is very liable to promote sepsis

The old idea that operation wounds go septic more easily in the tropics than in temperate climates is *not correct* If adequate pre operative attention is given, patients seem to do just as well in hospitals in the tropics as they do in hospitals in temperate climates If sufficient attention is given to the preparation of the pre-operative field, and the aseptic technique in the theatre is good, patients are not likely to go septic in the tropics any more readily than in temperate climates There are many points at which asepsis may break down The two greatest factors in the breakdown of aseptic technique are in the sterilisation of drums containing surgical dressings, and in the method of skin preparation If drum sterilisation is faulty it is usual to find a run of septic cases, with initially clean cases showing damp wounds, though not necessarily purulent, a small amount of sepsis only having been introduced Noting this on one occasion, enquiries were made about the method of sterilisation of drums, and it was found that the senior nurse responsible for packing the ward dressing drums and having them sterilised had relegated the duties to a labourer The labourer, having worked as conscientiously as possible, packed the drums and closed them, they were then put away in the place allocated for sterile drums The drums had not been sterilised at all the dressings were "socially clean" but not sterile The senior nurse was not aware of the absence of sterilisation, concluding that the drums, having been placed on the shelf used for sterile drums, had been to the sterilisation room, in readiness for the ward next day On detecting this breakdown in aseptic technique a rule had to be introduced whereby drums sent for sterilisation were signed for on going into the sterilisation section and being taken away from the sterilising room This prevented further faults If more drums are sent to the sterilising apparatus than the equipment can cope with in the time available, it may so happen that inadequate time is given to each batch of drums in order to save time

Many of the new sterilising units have apparatus attached to them whereby a chart is produced which indicates the temperature and pressure attained by the apparatus and the duration for which it is maintained, this helps to avoid errors

hexachlorophene or G-11, sold as a trade preparation under the name of Phisohex Following washing with this soap an application of 1 in 1,000 solution of tincture of zephiran chloride was the drug of choice This combination was very much the most popular, as indicated by the large number of answers received This combination for skin preparation is worthy of consideration in view of the result of the extensive investigation undertaken

A fungoid infection may be found about the groins of some patients, this is particularly common in Europeans in the tropics In many cases a Monilia infection is causative of this condition The use of a local application of mycostatin has been found very efficient for the treatment of this form of dermatitis as reported by *Sepulveda and Ibarra* [2] *From personal observations over several years, the* impression is gained that if there is a mild run of sepsis in a surgical ward the sterilisers are probably at fault Where most cases are quite clean and an occasional case goes very septic, the skin preparation or theatre technique is more probably at fault and not the sterilisers

Unfortunately patients are sent to the theatre, from time to time, inadequately prepared for the operation If this happens it is better to return the patient to the ward and defer the operation If this is done there is seldom a recurrence If, however, the patient is prepared in the theatre and the operation undertaken, a recurrence may happen Adequate preparation of patients in the ward before coming to the theatre should be insisted upon In exceptional cases a patient may have to be prepared in the theatre intentionally where, in serious accident cases, preparation under an anæsthetic is desirable

The majority of patients in the tropics tend to drink much larger quantities of water than patients in temperate climates It is advisable to restrict the intake of fluids for three hours prior to operation being undertaken If this is not done patients are very liable to vomit fluid during the induction of a general anæsthetic Patients should be encouraged to empty the bladder before going to the theatre, if patients are of necessity kept waiting a long time at theatre before operation can be undertaken it may be necessary to get them to empty the bladder a second time before the anæsthetic is started It is unnecessary and undesirable to catheterise all female patients as a routine before abdominal operations Only where pelvic operations are being anticipated should a catheter be passed, in such cases a urethral catheter should be left in the bladder so that the bladder is completely empty at the time the operation is started The passage of a catheter into the bladder is not without risk of infection Catheterisation should therefore only be carried out in the cases where it is essential

It is not necessary to give patients a routine enema before abdominal operations A good aperient should be given the day before operation and an enema avoided, except in special cases where it is particularly indicated This saves a lot of time for the nurses and avoids unnecessary discomfort for patients In only a very limited number of cases is an enema necessary

In order that clear information may be received from the ward with the patient to be operated upon a special " Nursing Record " form has been used for many years (Fig 14) This is found to be of great advantage The form helps to get the necessary information to the theatre for the surgeon responsible for the

sterile towels need not be put on as they tend to become displaced during the night when the patient is asleep If this preliminary preparation is relied upon a false sense of security will be given A second skin preparation is necessary on the day of the operation The patient has the site of the operation again well washed and a disinfectant applied, following this, sterile towels are put on the area concerned and held in place by bandages or adhesive Patients' backs need not be shaved as a general rule before spinal anæsthetics washing and cleaning alone is sufficient Shaving is unnecessary, and very frequently if shaving the back is attempted a little skin is removed from the irregular surface in the middle line due to the irregularity of the back, caused by the prominences of the spinal processes The excoriated areas are most uncomfortable for many days following this

Prickly heat may be troublesome in tropical climates Patients admitted to the wards for surgical operations may suffer from the condition on admission The condition can be effectively treated by the application of an aqueous solution of 1 in 500 parts of perchloride of mercury after a preliminary wash with a mercurial soap such as Asepso or Neko If prickly heat is very severe it may be necessary to defer operation It should be remembered that patients suffering from prickly heat may have some underlying condition giving rise to low fever, which is the precipitating factor Any such factor should be looked for and treated if present The possibility of a low-grade malaria should be considered and their blood looked at for parasites with this in view

Detergent soap powders are more efficient in cleaning skin before operation than ordinary soap, and a hot bath given using detergent soap powder gets rid of a very large quantity of surface cells and skin debris, and is highly efficient in the preparation of patients before operation If nurses help to bath a patient before operation when detergent powders are used in the bath water, they should use rubber gloves, as constant application of water containing detergent soaps makes hands very dry and rough Detergents remove much oil from the skin Detergent powders are relatively inexpensive there are many such commercial products sold for laundry work The disinfectant solution subsequently used depends largely on what is available The use of a 10 per cent solution of dettol is excellent Dettol itself is, again, a detergent substance It is apparent that in treating patients with a dark complexion a tremendous amount of superficial dead skin cells are removed by the use of dettol Solutions stronger than 10 per cent should not be used, as otherwise they may cause peeling of the skin in areas where the skin is soft This is very apparent if patients have a skin area prepared with 10 per cent dettol and the operation then deferred and two days later a further preparation is undertaken Peeling of the skin in soft areas may leave the patient very uncomfortable, this is seen most commonly in male patients about the scrotum This condition is equivalent to a mild chemical burn and may be a serious thing Dettol, though efficient, should be used with care Cetavlon is also an efficient detergent and disinfectant Mercurial solutions in spirit are also very efficient for skin preparation Such solutions are not always easily available

On a questionnaire circulated to a large number of surgeons in America recently asking them to state their preference for skin preparation, Medrek and Litsky[1] report that the consensus of opinion was in favour of the use of a phenol soap

own lack of knowledge at an early stage Junior nurses always have this difficulty to contend with In most tropical areas several languages are spoken, and by making a nurse fill in the nursing record it ensures that she must understand the instructions in order to complete the form If the nurse does not have to fill in the full details she can easily say "Yes, Sir," when she does not understand at all We have always allowed the anæsthetist to help the nurse in completing the Nursing Record but she must do the writing herself, so that it is essential for her to understand moderately well before this can be done All members agree that the Nursing Record form is a great help By using the Nursing Record they learn quite a lot of new words and can take a more intelligent interest in the operation performed Whether a drain or pack was used is indicated and the sutures inserted Space is available to indicate the type of post operative treatment required This is useful to the ward nurses and gives them some authority to carry out the immediate post-operative instructions which inevitably cannot be written by the surgeon in charge of the case while he is still busy in the theatre

In the large hospital wards concerned there is often difficulty about the correct timing of cases going to the theatre Much the easiest and best method of getting over this difficulty is to avoid any verbal messages A "Theatre Transit Card" should be sent to the ward by a senior member of the theatre staff who is responsible for the arrangement of the cases, stating that the case required should be sent at a fixed time Ward nurses should not send cases to the theatre on verbal instructions, if written instructions are sent on a "Theatre Transit Card" very few errors occur This method assists greatly in the smooth working of the theatre By sending such a card stating exactly the time a patient is required in the theatre, the necessary ward arrangements can be carried out smoothly without undue rush Atropin injections can be properly timed or a sedative given if previously ordered

SEDATION PRE-OPERATION AND POST-OPERATION

The subject of sedation immediately before and immediately after operation is one which largely concerns the anæsthetist, depending on the type of anæsthetic anticipated, it will therefore be referred to in detail under the section on anæsthesia At this stage the subject will be dealt with in rather a different sense Sedation may be required for a considerable time before operation, not only in the immediate operative period Following operations when the patient has recovered from the early effects of the operation, he still may require some form of sedation It is with sedation at these two more remote stages that some remarks are here included There are few people who, having to undergo a surgical operation, are not greatly concerned with the serious implications involved Such an undertaking is a matter of considerable concern, whether it be a major or a minor operation Looking at this long-term aspect of adjustment of a patient to such an important event it can be said without doubt that one of the greatest forms of sedation for any patient before operation is the confidence in the doctor who is to undertake the operation It is most important, therefore, that the doctor and the patient should co operate in this matter as fully as possible It may be

case Space is available for a short description of the operation undertaken so that the nurses in the wards know exactly what operation was performed. On some occasions it may so happen that the operation anticipated is not undertaken,

NURSING RECORD

Name Ward

T P R

Hæmoglobin

Date

Pre-op med

X-ray films

If catheterised

Urine test

Anæsthetic

Operation

Drain or pack

Sutures

Post-op instructions

Surgeon

Assistant

FIG 14
Specimen of a "Nursing Record" form

some slightly different procedure being found necessary It is essential to indicate this to the nurse in charge of the ward to which the patient returns In some cases the patient may be returned to a different ward to that from which he has been sent to the theatre Remembering one's student days, the difficulty of understanding the nature of an operation can be appreciated considering one's

details of the method termed psychoprophylaxis in labour and details of the method can be referred to from the section on Surgery in Pregnancy, Chapter 14—suffice to say here that it was considered that 94 per cent of the patients so treated by preliminary educational methods before delivery benefited from the procedure By increased co-ordination of effort and greater co-operation in the method of delivery, it appears that parturition is made considerably easier With this in mind it would appear that there may be considerable advantage, though possibly less easy to measure, in the case of surgical patients The immediate post-operative sedation of a patient is usually ordered by the anæsthetist if a qualified doctor administers the anæsthetic, otherwise the doctor performing the operation orders the sedative at the time of operation

Considering the later post-operative sedation, there are several interesting points which may be here looked into with advantage If a patient has been off fluid for some hours before operation and has lost a fair amount of fluid by sweating during operation, he is usually to some extent dehydrated It is an advantage in a large proportion of the cases undergoing major surgery that they should be given fluid per rectum immediately following operation during the time they cannot take fluid by mouth The method of giving two pints of tap water per rectum twice a day for the first day or two following operation is an advantage The addition of 30 gr of potassium bromide and 30 gr of chloral hydrate to the 2 pints of fluid has a marked sedative effect Patients usually sleep for several hours if this method is used they have the advantage of the fluid given also This method is simple and safe and very efficient, it is also inexpensive

It is a great benefit to patients if they can get over the first forty-eight hours easily with adequate sleep after operation Alcohol given per rectum works extremely well as a post-operative sedative The method is very popular on the Continent of Europe An excellent article by Hsu Ching-Yeh [5] on this subject of protective sleep in abdominal surgery has been contributed to the literature The method used is as follows 100 c c of 30 per cent alcohol (ethanol) is given per rectum post-operatively It is given slowly with a rectal catheter Sleep is induced within about twenty minutes This quantity of 100 c c of fluid can be given morning and evening if required Ordinary whisky closely simulates 30 per cent ethanol and can be used If for any reason the rectal method is considered not advisable, though it is seldom contraindicated, intravenous alcohol glucose solution can be used, the technique being that the following solution is given 25 gm glucose, 4 gm sodium chloride, 1 gm calcium chloride, 60 c c absolute alcohol, 500 c c distilled water This is given as an intravenous drip The first 100 c c is run in fairly quickly during the first twenty minutes, after that 30 drops per minute are given The total volume used is from 500 to 1,500 c c per day In addition, 0 2 gm of sodium luminate may be given as an intramuscular injection if required With this intravenous technique the patient will sleep from forty-eight to seventy two hours In the case of sedation in labour cases, 25 c c ethyl alcohol can be given intravenously in 500 c c of 5 per cent glucose saline This is given intravenously at the rate of 60 drops to the minute this has a marked sedative effect To prevent the sedative effect inhibiting the labour pains, 5 units of pitocin may be

necessary to spend a little extra time to reassure a patient and so help him to face what to him is a serious situation It is much better to ask a patient when he would like to come into hospital rather than inform him that he will come into hospital on a certain day It is not wise under any circumstances to use mental force with a patient to persuade or coerce him into having an operation patients who have not got full confidence in the doctor do notoriously badly Many patients will face an operation much more confidently if they are allowed to return home and discuss the matter with their relatives In some patients there is a marked degree of nervousness and apprehension To undertake any surgery on a patient in such a frame of mind is very unwise Such patients can with advantage be put on small doses of bromides it has been found very helpful in certain cases to use largactil as a tranquillising sedative Following the use of this drug patients develop what the French call *la grande indifference*, this is a great advantage Barbiturate drugs given in small doses have somewhat the same effect, though it is not so marked Caution must be exercised in the use of such drugs as soneryl—small doses only being suitable Soneryl should not be used in the immediate pre-operative period if general anæsthesia is anticipated as it markedly depresses respiration After surgical treatment has been decided upon it is not an advantage to discuss any technical details with patients as they do not sufficiently understand such procedure for explanations to be an advantage Any such explanation is more likely to cause alarm It may, however, be of some help to explain a little about the theatre, otherwise they may be rather alarmed seeing the staff covered up with gowns, caps and masks Having discussed this matter with nursing staff and convalescent patients, it seems that there may be some advantage in telling those about to be operated upon what they may expect to see on arrival at the theatre

Closely allied to this matter of informing patients before operation what they may see at the theatre, it is of considerable interest to note that in obstetrical practice there has been a marked tendency to the shortening of the duration of labour, especially in primipara, by instructing patients deliberately concerning the procedure and mechanism of delivery Macafee,[3] speaking of the changing face of obstetr[illegible]

seen that the total duration of labour from the time of onset of the labour pains to the delivery of the placenta, in primipara, has markedly decreased between the years 1938-54, the figures being, 1938, twenty-seven hours fifty minutes, and a progressively shorter period annually until 1954, when the duration of labour was sixteen hours fifty-two minutes on an average This is a remarkable change in what is a normal physiological process It was also noted that the average blood loss with delivery was considerably less with the shorter and easier labour, this is again a most important point It has also been noted that on the Continent of Europe considerable advantage is gained in giving patients preliminary instruction about the mechanism of labour It has now become highly specialised in some centres Platonov and others in Russia, on observing a very large series of cases, have made similar observations Ch'En,[4] working in China, gives

appeared like longitudinal slits in the skin, these lines indicate the lines of elastic tissue Langer's lines (or the lines of elastic tissue) can very easily be found, as pointed out by McLaughlin,[6] by pinching the skin in two opposite directions and noting in which direction the skin tends to make a natural fold The natural line of fold corresponds to Langer's lines and the direction of the elastic fibres The *natural fold line is the* optimum direction for incision in any particular site, with a view to avoiding as far as possible keloid formation In some parts of the body such folds are very obvious but in other parts they are not so easy to detect When a patient in the sitting position leans forward, lowering the head and shoulders, the lines across the abdomen indicating the folding of the fat appear along Langer's lines These lines on the abdomen tend to be along a curved transverse arc with the convexity slightly downwards, the fold starts slightly above the anterior superior iliac spines on each side and stretches across the abdomen a little above the pubis This major skin fold is easily noted, and is an important line surgically, especially in keloid-forming patients as it gives the easiest and most satisfactory access to the lower abdomen with the minimal keloid formation The incision should be made accurately along this line A midline vertical subumbilical incision is a very useful and much used incision for pelvic surgery If this incision is extended on to the pubic area, in keloid-forming patients, especially females, a most unsightly and uncomfortable keloid scar develops at the lower inch of the wound If a lower abdominal incision is extended on to the front of the pubis it cuts directly across the line of the elastic tissue fibres at right angles which are disposed about the pubic area in the shape of a horseshoe, extending round the site of the external genital organs down to the perineum

The extending of a subumbilical midline abdominal incision to the front of the pubis is a very common surgical error in surgery in the tropics One of the few incisions whereby an African abdomen can be opened without keloid formation is by keeping very strictly and accurately in the line of fold of the fat of the lower abdomen This incision may be extended from one anterior superior iliac spine to the other The lowermost point of this line is just a little above the level of the transverse elastic fibres which encircle the front of the pubis Two photographs are given for comparison between the results following the use of these two incisions on African female patients Both photographs were taken about eight months after operation (Figs 15 and 16) The vertical incision was carried out in a distant hospital for some pelvic complaint, the nature of which is not known The patient requested treatment for the keloid scar The patient with the transverse incision, the scar of which is scarcely visible, was also operated upon for a major pelvic complaint She made a very satisfactory recovery with a neat scar following operation In the case of the transverse wound, the rectus muscles were cut across completely intentionally They were accurately repaired in closing the wound The wound was closed in layers, four floss nylon sutures were inserted *into the aponeurotic* layers in order to reinforce the strength of the wound No penetrating stitches through the skin were used at all Michel clips only were applied on the surface skin

Transverse section of the rectus muscles, if properly done, does not appear to cause any disability subsequently The use of a transverse external skin incision

lded Pitocin acts as a counteracting uterine stimulant Pitocin, of course, should ot be given in cases where there is any evidence of possible obstetrical obstruction

After the urgent stage of an operation is over and the stronger sedatives cease be required, aspirin, phenacetin and caffeine is one of the best, simplest and fest sedatives It has many advantages and few disadvantages Pentothal given •r rectum following operation is also very useful as a sedative In some cases eshly prepared avertin or bromethal, given per rectum, is an excellent sedative ie use of either of these drugs may be considered with advantage

SURGICAL WOUNDS AND SCARS

Surgery in the tropics is attended by many serious difficulties One of these lifficulties is the marked tendency in dark skinned patients to keloid formation The problem is discussed at some length in the chapter on Plastic Surgery Every ffort should be made to prevent keloid formation in patients who are liable to he condition The tendency appears to be more marked in patients of African origin than other patients in the tropics though it occurs to a varying extent in most races Care is necessary in the planning of surgical wounds Incisions must be carefully placed so that the field of operation can be exposed as efficiently as possible through the minimum opening in the skin Where keloid formation is not any problem the length of the incision is not very important Many surgeons working in temperate climates, dealing with patients who do not normally form keloid scars, make relatively enormous incisions An adequate incision has many advantages and may reasonably be made if there are no attendant disadvantages In surgery in the tropics there are many disadvantages attendant on long wounds and much discomfort caused by injudicious surgical wounds due to late keloid formation It therefore becomes a basic principle in surgery in the tropics that incisions should not be longer than absolutely necessary for the purpose for which they are designed The placing of an incision needs much more careful consideration than is usually required in non-tropical surgery Seeing the gross keloid formation in African patients returning from Europe to Africa following surgery in Europe, it is quite apparent that no consideration at all has been given to the question of possible subsequent keloid formation The placing of a wound should be such that the minimum keloid formation will be produced

The disposition of Langer's lines are of academic interest only to those in areas where keloids are not formed in members of the population following surgery The importance of Langer's lines is much more fully appreciated by those undertaking plastic surgery in view of the fact that a better scar can be obtained if incisions are made as far as possible in the direction of Langer's lines, not transverse to them Langer's lines conform to the disposition of elastic tissue, running parallel to the line of these fibres If tissues are cut at right angles to the elastic tissue fibres there is a much greater tendency to keloid formation Many of the older anatomy books gave diagrams indicating the disposition of these lines, such diagrams are omitted from the new anatomical textbooks The lines were originally worked out ingeniously by Langer, who, perforating the skin with a circular stiletto noted that the perforations following withdrawal of the instrument

form keloids show a keloid nodule even following an intramuscular injection, there being a leak of fat along the needle track to the pigmented layer of the skin

If it is necessary to remove a ganglion from the dorsum of the wrist the incision should be in the transverse direction and not in the long axis of the arm It can easily be seen by pinching the skin that the transverse direction is the natural and easy line of fold In the case of septic hands requiring incision for the evacuation of pus, it is desirable if possible to open into the septic area through one of the normal creases in the hand using a small incision at the point where the crease crosses the septic area If the creases are obliterated by the swelling, the position of the crease can be estimated by examining the other non-infected hand

Removal of enlarged glands in the neck, using the block dissection method, should not be carried out through the standard incision along the anterior border of the sternomastoid muscle This incision gives a very ugly scar in keloid-forming patients It is much better to use a rather horizontal incision, keeping close to the natural folds of the neck, this gives an excellent result, with minimal or no keloid formation Clean thyroid scars made in the natural creases of the neck form very little keloid tissue even though they are extensive in length

A short standard inguinal incision does not form a bad keloid scar in most cases following inguinal herniotomy It should not be extended too far medially into the pre-pubic area it is only at the medial end of such wounds that keloid formation may become troublesome Some parts of the body do not form keloid scars at all in patients who do form keloids elsewhere They have one factor common to them all—the absence of subcutaneous fat these parts are the skin of the penis, the scrotum and the eyelids Certain other areas have very little tendency to form keloids, they are the perineal area and the scalp above a line joining the external occipital protuberance behind and the nasion in front It is remarkable to note the complete absence of keloid formation after an incision is made through the eyebrow in order to operate on an infected frontal sinus No matter how badly the scalp may be lacerated above this line it does not appear to form keloid tissue subsequently No reactionary tissue comparable to keloid is found elsewhere in the body other than associated with the pigmented layers of the skin, which has an underlying layer of fat

The case of a patient disfigured by the condition known as goundou presents a surgical problem as to the most suitable incision to use in removing the bony mass present To make two incisions over the bony masses would cause marked facial disfigurement The difficulty can be circumvented by using a midline incision over the bridge of the nose extending upwards for about 1 in to allow lifting of the edges A photograph taken of such a case before operation and six months after operation shows the result of this procedure (Figs 17 and 18) A small amount of keloid scar occurred in the lower end of the wound, but this was getting less, it was more in the nature of hypertrophy of the wound than a

the

ith

ive

incisions The maximum hypertrophy seen in scars appears to be at about six *months* after operation, they tend to retrogress after this time If true keloid

and a longitudinal splitting of the abdominal wall in the midline beneath this is an unsatisfactory method of gaining access to the pelvis If the superficial fatty layers are lifted sufficiently to lengthen the deep muscle incision, made in the vertical direction, the patient is very liable to form an extensive hæmatoma under the fat, and the case may more easily become infected The rectus muscles should be cut across deliberately in the same line as the skin incision Many surgeons are reluctant to undertake a move which they have not been taught as students, and to cut the rectus muscle intentionally for the first time may be a little alarming, but realising the excellent access afforded by the manœuvre and





Fig 15 Fig 16

Fig 15 —Vertical suprapubic incision
Fig 16 —Transverse suprapubic incision

the easy convalescence the patient enjoys soon convinced the operator of the advantages and the absence of disadvantages Accurate closure of the wound is essential, and before putting in the metal clips a fine layer of chromic gut should be put in the deep fascial layer Following this the wound edges should be swabbed clean of all loose fat There appears to be considerable evidence to suggest that the precipitating factors in the formation of keloids are the action of degenerating fat and the presence of a melanotic layer in the skin The presence of both factors is essential for keloid formation The removal of loose fat is therefore essential to the attaining of good wounds in patients of a dark complexion where a heavy melanotic layer is found Keloid formation occurs only if the fatty layer is involved in any wound It can be noted that where the sepsis in a vaccination mark does not penetrate the fatty layer a flat smooth scar results, whereas if the sepsis goes deeper, involving the fatty tissues beneath the skin, an extensive keloid is usually formed Many patients with a marked tendency to

ASEPTIC PRECAUTIONS: TISSUE HANDLING

It is disappointing to patients, doctors and nurses to find clean surgical cases becoming infected There are so many factors involved in the preparation for and carrying out of a surgical operation that it is not easy to know at what point the breakdown in aseptic technique has occurred when this happens In spite of the general principles of bacteriology being understood by doctors and senior nursing staff, it is difficult for all members of the staff to maintain rigid asepsis at all points This short chapter has been termed " Operative Approach " rather than " Operative Technique " after some consideration Operative technique concerns the technical procedure involved in an operation, but this is only a limited part of operative approach, which takes into consideration the wider factors which are necessary to ensure good results Where pre-operative preparation of the patient has been good and sterility of the instruments and dressings in the theatre adequate, no infection should occur in surgical wounds Primary union of clean tissues is the rule It is necessary to point out that in spite of cases being well prepared and the surgical technique being good, a small number of cases still become infected The importance of a patient's general condition before operation has already been referred to A patient who is in a poor nutritional state, suffering from hypoproteinæmia and a low hæmoglobin level, is much more likely to develop infection in his wound than a patient whose general nutrition is good Careful selection of patients for surgery is therefore an important factor in the attaining of good results, not only in temperate climates but much more so in the tropics

The majority of small country hospitals suffer from the great disadvantage that there is usually only one theatre available in which to deal with all cases Clean and infected cases of all sorts have to go to the same theatre General surgery, orthopædics and obstetrics, whether clean or infected, are all dealt with in one theatre—this is a most undesirable state of affairs One of the most important extensions to any country hospital is the building of a second theatre in order to separate clean from infected cases, this is much more important than building an additional ward As it is very expensive to have all instruments duplicated for each of the two theatres, it is usually satisfactory to build two theatres with an intervening sterilising room between them This arrangement involves the minimum expenditure of money and is reasonably efficient The setting of and approach to an operating theatre are the two most important factors in the reduction of sepsis If a theatre has not got a proper concrete approach but is surrounded by a dusty sandy area which must be crossed by patients and staff in going to the theatre, it can be understood that an increased rate of sepsis is almost inevitable

With these points in mind the matter was investigated by Stephens [7] while working in an up-country station hospital in West Africa in 1931, who, on having specimens of material examined from the theatre and its surroundings, obtained the following results, reported by Professor Tulloch "We have got an abundant growth of tetanus bacilli from the mound outside the operating theatre, and also in dirt from outside the theatre window, but no tetanus bacilli were

formation occurs the condition appears to be progressive, reaching in some instances an enormous size

In the case of incisions being necessary for the evacuation of pus from septic areas as from muscle abscesses, there may be little option as to the site of the incision. Localised collections of inflammatory material and pus should be evacuated through short incisions There is little advantage gained by long incisions Many enormous abscesses can be drained quite adequately by a





FIG 17 FIG 18

Fig 17 — 'Goundu case before operation
Fig 18 —Same case after operation

1 in incision, this is sufficiently large to insert a gloved finger if this is necessary to break down loculations and is also large enough through which to insert a drainage tube if this is required

To those recently arrived in tropical areas it may appear very tempting to try to remove a subcutaneous guinea worm by dissection, but to do this is a very unwise procedure The guinea worm can seldom be removed complete by this method, the wound has to be of a very large size it heals very slowly and is excessively painful No advantage is gained by such a dissection and considerable additional invalidism may be produced

Hydroceles should be operated upon through the scrotal skin by a direct approach and not through inguinal incisions The absence of keloid formation in the scrotum is a great advantage There is much less likelihood of hæmatoma formation with the direct approach and the scrotal incision can subsequently not be seen Inguinal incisions for hydrocele operations should be given up

It is unfair to other patients to bring septic cases to a clean theatre for the removal of plaster of Paris

So far, only a very small proportion of operating theatres in the tropics are air-conditioned There is much to be said in favour of air-conditioning The apparatus must be working efficiently all the time, or it can be a nuisance It has been noted in America that the examination of air in theatres before and after air-conditioning indicates that there is a 58 per cent reduction in bacterial contamination in air-conditioned theatres by comparison with non-air conditioned theatres near by This is a most important observation and indicates that air-conditioning is an advantage in decreasing sepsis apart from the added comfort afforded With the apparatus now available for air-conditioning rooms in private houses and offices, it is not difficult to air-condition operating theatres Air-conditioning of theatres should be considered in all stations where there is an electricity supply as a source of power Air-conditioning is considered a necessary improvement in surgical approach relative to the operating theatre at least, apart from the additional comfort afforded to those working in the theatre

The atmospheric conditions vary so greatly in different parts of the tropics throughout the world and from one part of the year to another that it is not possible to give fixed rules as to the optimum conditions to be aimed at Having worked in countries where the temperature was almost constantly 84° F and the humidity between 90 and 100 per cent for much of the year, it was found that with such a high humidity, sweating became profuse when the temperature became 88° F People vary as to the temperature at which they sweat freely It was found that the most pleasant temperature to work in was a temperature of 75° F and a humidity of 70 per cent It is undesirable to over air-condition the theatre If the conditions vary greatly between the inside conditions and the external atmospheric conditions patients may show a marked degree of shock on going from the lower temperature and humidity of the theatre to the higher external temperature and humidity The blood-pressure may fall if the conditions vary too greatly, and this is undesirable following an operation of a major type The introduction of a large quantity of steam from the adjoining sterilising room to the main theatre is undesirable as it increases the humidity and predisposes to sweating In a non-air-conditioned theatre in the tropics it is essential to have an adequate outlet for the steam The outlets should be placed in a high position in the room If there is constant steam in the sterilisation room it predisposes to the growth of fungus on the walls

There is much to be said in favour of the use of dry heat being used for sterilisation of instruments, as opposed to water boilers An electrically controlled hot-air oven is much less expensive than multiple electrical boilers it is easy and convenient to work and a temperature of 110° C for three hours is quite adequate to sterilise all apparatus Having seen such apparatus in use the advantages are quite apparent Hot-air ovens are usually not large enough to sterilise large bowls To get over this difficulty it appears quite practical to flame the bowls and subsequently store them in a 1 per cent cresol solution Bacteriologically this may not appear to be ideal, but in practice it works well and there is no apparent sepsis resulting from it As it takes a prolonged time to

found from the ceiling of the theatre, we had no difficulty in finding tetanus bacilli in the sites named" This investigation was no doubt the result of concern due to infection occurring in wounds following operation

In 1956, at a large hospital in the tropics, an investigation was carried out for tetanus following several cases developing tetanus after operation It was found that the sterilisation of apparatus and equipment was inadequate The sterilisers were found to be defective Bacteriological examination of material removed from several sites in the theatre showed tetanus bacilli in debris collected from the floor cracks, from sites in the wash-up room, and even from bowls containing ligature material

The old fashioned method of using tiles to floor theatres should be abandoned One complete polished concrete surface should be used this is the easiest form of flooring to keep clean Builders commonly lay floors in several sections in order that a section may be removed if a crack occurs The tendency to use geometrical patterns in flooring predisposes to a division going through the centre of the floor under the usual position of the lamp With centrally placed flooring divisions, contamination by infected material is common at this site When patients are operated upon in the lithotomy position, the table is moved slightly away from the middle of the theatre in order to have the light projected at an angle The centre of the floor is liable to become contaminated during rectal operations, and tetanus may be introduced into the cracks

Noting the ease with which tetanus bacilli were found from the material removed from cracks in the floor of a theatre elsewhere, it was decided to have the floors changed in our own theatres to facilitate floor cleaning The expense of having the floors re-made was considered justified in view of the potential danger of tetanus occurring Careful attention to theatre floors is essential If divisions are already present in the floors of operating theatres and the floors cannot be replaced, it is possible to sterilise these by the use of a plumber's blow lamp to flame the cracks this is not likely to do any harm to stone floors and will kill off the tetanus bacilli and spores Some of the commercial firms sell flaming apparatus for weed-killing by the same method The seeds of weeds are killed by the flame passing over the ground and all superficially placed seeds are killed off The same apparatus might reasonably be used on hospital theatre floors of the non inflammable type

General out-patients should not be allowed to come to the main theatre for surgical operations If it is found necessary to undertake minor operations for them, they should be prepared in the out-patient department and sent to the main theatre on a trolley not accompanied by relatives They can be returned to the out-patient department following operation, to rest until they are fit to go home accompanied by a relative All surgical consultations should take place at the out-patient department and not at the theatre there is unfortunately a great tendency for patients to go to the theatre, as they think that by going there they may be seen more quickly than at the out patient consulting rooms Plaster of Paris should not be removed at the theatre this should be done in the ward for in patients, and in the out-patient department for out-patients Compound fractures, even though making satisfactory progress, may be notoriously septic

with swabs and disinfectants should be undertaken with the swabs in holders and not in the fingers It is a good working rule to extend the area of skin painting 1 ft in all directions from the centre of the incision anticipated Unless an adequate area is properly cleaned before towels are applied the area may again become contaminated, due to slight slipping of a towel from an area that has not been cleaned up It is unfortunately a common habit to use a hand as a retractor instead of a proper metal retractor of suitable type It may take a considerable time to become adept in the use of a retractor or forceps in the left hand, but these should certainly be used In swabbing an operation wound, it is desirable to use a swab held in forceps, not in the fingers

Handling of tissues may be predisposed to by insufficient retractors being at hand self-retaining tractors should always be available Any apparatus which improves the visual field of an operation site should not be neglected Much less handling of tissues is necessary if there is adequate light in the operation area It is desirable sometimes to have a laterally placed light in order to get adequate illumination of the area being operated upon This is particularly so in the case of limb operations with lateral incisions The points mentioned are all important in considering operative approach in the broad sense Adequate attention to such details reduces the sepsis rate very much Smoking should not be permitted inside any part of the operation theatre

For stations with electrical supplies, shadowless lamps are available in several different models They give excellent illumination , they are, however, expensive A much less expensive form of illumination can be produced by the use of long tubular bulbs which are not expensive Because of their length they cast a light which is equivalent to a shadowless lamp If two or three of these long bulbs are used, some distance apart, they have the same effect as a shadowless lamp and are most efficient, at a very low cost The accumulator model of shadowless lamp, suitable for moving from place to place on the operating theatre floor, is also most valuable It has the great advantage that it can be used in stations where there is no main electrical supply With the addition of a long electrical lead, it can be easily attached to the battery of a motor car placed outside the operating theatre. This model should be available in all country stations because of the difficulty of adequate lighting after dark in places where there is no main electricity supply A large mirror in the operating theatre held by a nurse in the appropriate position can sometimes be used with advantage to produce an excellent reflected light if no floor lamp is available The fog light made for a motor car is also a useful accessory in country stations as it can easily be attached on a long lead to a car battery outside the operating theatre those mounted in a ball and-socket joint are excellent The voltage of the bulb must correspond to the battery available

LIGATURE MATERIAL

The subject of ligature material constantly exercises the mind of surgeons all over the world The suitability of material is the main concern of those working in areas where the supplies are good The availability of material is the greater concern of those working in areas where supplies are poor In tropical areas of

"dry sterilise' instruments, it is desirable to have an instrument table placed over the patient's legs during the operation so that the instruments may be placed on it without the risk of falling on the floor If instruments fall on the floor and dry sterilisation is being used, they cannot be re-sterilised quickly In some instances it may be necessary to put out slightly more instruments a few extra forceps and extra scissors are desirable

Operations should not be undertaken without the surgeon and the staff in the theatre being properly dressed for operation Caps, masks, gowns and boots should be used for all operations by doctors and all the nursing staff Rubber boots should also be worn by all persons coming into the theatre Rubber gloves should be worn for all operations, not only to safeguard the patient but also the doctor and nurses During 1940 it so happened that at one station it was difficult to get any rubber gloves at all—operations were therefore performed without them It was apparent that the rate of infection in surgical wounds was increased by *not wearing rubber gloves The doctor and nurses assisting at the operation should* change gowns and gloves for each operation This necessitates having a very large amount of theatre linen, but it is essential if the standard of asepsis is to be maintained

In many tropical hospitals there is not a chlorinated water supply Water may have to be drawn from wells or tanks filled from roofs There is an obvious risk of sepsis due to a poor water supply Water collected from roofs and stored in tanks for several months appears to have a very low bacterial content Having used such water for washing before operation in country stations on many occasions no trouble appeared to result, a small quantity of dettol was added to the water for washing purposes It is desirable, however, to boil all water before use in the theatre if not already chlorinated Tipping containers for liquid soap should not be used, it is difficult to keep them adequately cleaned, therefore they are better not inserted in the washing rooms at all

Those with limited experience tend to handle the skin of patients before operation is started in order to determine anatomical points It is very difficult to sterilise skin completely no matter what care is taken Skin should not be handled under any circumstances directly with rubber gloves If it is necessary in some cases to determine anatomical points by palpating the skin, this should be done through a thick swab in the hand so that the glove does not touch the skin directly, the swab is then discarded

Looking back on earlier years in the tropics it is quite apparent that there was a higher rate of infection in my own patients' surgical wounds than in latter years Observing junior doctors with limited experience undertaking operations, it is also apparent that the increased rate of sepsis seen is predisposed to by injudicious handling of the skin and deep tissues Lack of skin edge towels is a very common error Skin should not be handled directly under any circumstances This particularly applies to the skin of the scrotum which is particularly difficult to clean adequately If the skin of the scrotum is handled during hydrocele operations and subsequently the inside tissues handled directly, cases very frequently become somewhat infected Skin towels should be used on all cases of operation on the scrotum as elsewhere The preliminary painting of the operation area

of vesico-vaginal fistulæ, it works well, but would appear to have no advantages over monofilament nylon, which is much easier to handle, both these ligature materials are removed after the fistula is healed

Braided nylon used as a surface suture material in pigmented skins is liable to be followed by marked keloid formation, particularly at the puncture-wound marks where the suture penetrates the skin It is quite a suitable material for the internal sutures in the repair of inguinal herniæ though floss nylon is probably rather better for this purpose Floss silk and Chinese twist silk are unsuitable materials for the repair of inguinal herniæ In a high proportion of the cases, not less than 20 per cent, the silk ultimately comes out this is far too high a proportion of complications to justify the use of these materials in hernia repair operations Ligature material which ulcerates out slowly usually has to be removed, not by the doctor who inserted it but by his successor

Floss nylon, as recommen [illegible] material for hernia repair operations [illegible] it appears most satisfactory, [illegible] used Floss nylon is therefore recommended for the repair of inguinal hernia It is a strong soft material and very non-irritant and can be sterilised by boiling, it is also very inexpensive and is supplied by John Bell & Croyden, London

Realising the high recurrence rate following hernia repair operations using catgut alone, kangaroo tendon was introduced many years ago as a more durable repair material This material gave a good repair and was non irritant, but it took a very long time before it became absorbed The fine and intermediate gauges were most suitable but the thick grade was too heavy and the knot could be felt under the skin, inconveniencing patients The more modern nylon products have largely replaced kangaroo tendon

For many years a strip of fascia lata was used in the repair of inguinal herniæ This is a most useful and satisfactory technique It has one great advantage in the tropics, namely, that the material is always fresh and available from the individual patient from whom it is removed The recurrence rate of hernia following fascial repairs is very low, in the level of 2 to 5 per cent To arrive at a fair estimate of one's own failures it is usually fairly accurate to multiply your own known faults by three Having seen about 2 per cent recurrence rate following inguinal hernia operations using fascia lata, it is probably fair to say that in the series undertaken personally the recurrence rate was in the level of 6 per cent over a five-year period Considering the very large herniæ dealt with in patients in rather poor condition, this is not an unduly high recurrence rate If a large incision is made in the thigh for removal of the fascia lata, by the open method, muscle herniation may occasionally occur Muscle herniation is extremely rare following the removal of the fascia lata with a fasciatome Having tried several types of fasciatome, the Wilfred Adams instrument is considered the easiest to use and most satisfactory Using this instrument it takes not more than three minutes to remove a good piece of fascia up to 10 in long and close the 1 in incision through which it was removed Hæmatoma formation and sepsis following the use of this instrument are extremely rare This piece of apparatus should be available in all country stations in the tropics Fascia

the world, where supplies are in some cases poor, it is most important to understand the uses and limitations of the various materials which may be at hand in order to make the best use of the limited supplies available The time factor in getting supplies in remote places is always a great difficulty It would necessitate carrying a very large stock in each individual hospital to have available at any time the particular suture which might be required for a particular job In temperate climates where most of the ligature material is made, the dominance of white skin has led to the production of most ligature materials in dark shades for contrast black, dark brown, purple and dark green It is difficult to see dark ligature material on dark brown skin It is advisable in ordering ligature material for use in the tropics, where most patients have a dark complexion, to specify that the material supplied should be white if available If ligature material in the skin is difficult to see, being the same colour as the skin, it may be removed inefficiently and part of the ligature remain in the tissues Residual insoluble material under the skin frequently gives trouble at a later date The colour of the external ligature material is quite important for this reason Insoluble ligature material not infrequently comes out after many months or even some years It is necessary always to use a good light over a patient when removing sutures

Monofilament nylon has become the standard suture material for skin in most parts of the world It does not absorb fluid from the local tissues and is very non irritant On looking at the knot made with monofilament nylon, using a strong magnifying glass, however, it can be seen that the knots do not usually close completely, as the material does not bend well Surgeons undertaking plastic surgery do not usually consider it is a suitable material for suturing skin accurately, as it does not lie entirely flat on the whole skin surface Fine waxed silk is considered more suitable for skin suture than monofilament nylon In dark skins which are prone to form keloid tissue the avoidance of any skin sutures other than Michel clips is a great advantage, if by such means the wound can be adequately approximated To make the internal suturing of a wound sufficiently strong to permit of healing in good position is important Michel clips used on the surface do not penetrate the full thickness of the skin and so do not produce keloid tissue For approximation of skin surfaces Michel clips are excellent, the middle and small sizes are the most suitable, the large size is seldom used The small size Michel clips are very satisfactory for closure of wounds where the skin is of fine texture, such as the neck in thyroid cases This matter is again referred to in more detail under the section on Plastic Surgery Monofilament nylon has been much used by some workers as an internal suture material in the repair of inguinal herniæ and the results have been good In a small number of the cases, however, the patients complain of feeling a stitch in the deep tissues rather like a pin being present under the skin In some cases a stitch has to be removed at a later date because of this discomfort Monofilament nylon has been used in some centres to suture the uterus following Cæsarean section, this appears to be an unwise practice and quite unnecessary Careful suturing with catgut gives a very satisfactory repair and the material is absorbable Silver wire as a suture material for umbilical hernia repair has been used and advocated by some workers but it is not popular Silver wire has been used also in the repair

it is much safer than catgut Thread does not swell and soften in the same manner as catgut, and is therefore much more stable on ligatured points and much less likely to slip off It is an excellent material for deep vascular ligation, such as for tying the cystic artery or the cystic duct, and is also suitable for tying splenic vessels and vessels in the pelvis It does not appear to give rise to any obvious irritation placed within the peritoneal cavity

Linen or cotton thread should be used in tying off the mesenteric vessels when a gut resection is being undertaken thread is safer than catgut in this position Catgut ligatures are very liable to slip in this site as opposed to thread which holds very firmly, and whereas catgut, on an atraumatic needle, is most commonly used in performing an intestinal anastomosis, thread can be used and is very satisfactory Thread can be used throughout in gastric operations without any apparent disadvantage, and being a soft material can be used on a straight non-cutting needle, it does not make an unduly large perforation when pulled through the tissues The perforation made by a non-cutting needle and thread is much smaller than the perforation made by a non-cutting needle and catgut The ends of thread ligatures can safely be cut much shorter than can catgut ligature ends Since 3 mm is sufficient for the cut ends of a thread ligature, it is desirable to give considerably more length for catgut as the ligature is very liable to slip Not less than 6 mm should be given as a minimum length for cutting off catgut when medium and large blood-vessels are being tied off, to avoid its slipping off, as it becomes swollen with the absorption of local fluid As fine chromic catgut is usually used in tendon repairs, it is probably an advantage to put in one insoluble thread suture followed by two chromic catgut sutures in undertaking tendon repairs

Thread is not a suitable material for repair of vesico-vaginal fistula the fistula almost invariably breaks down again if it is used, the ligatures become encrusted with phosphatic material, the points of entry of the sutures become progressively enlarged, and the fistula ultimately leaks again through the suture perforation Fig 21 illustrates the encrustation occurring on thread ligatures removed from a vesico-vaginal fistula case The patient from whom these ligatures were removed was operated upon elsewhere on two occasions for repair of vesico-vaginal fistula without success Following a further repair with more suitable material, the fistula closed quite easily Fine chromic catgut was used for the internal layers and monofilament nylon in the external layer of vaginal skin

Sellotape, a transparent plastic material, may be used with advantage to draw the edges of wounds together and relieve tension As the material may not necessarily be sterile, it is advisable to put a small dressing over the actual wound itself and sellotape over this The fact that sellotape is transparent is a great advantage, and the wound can be observed beneath the sellotape Sellotape can be purchased in various widths from 1 cm up to about 12 cm broad The wide varieties may be large enough to cover a wound completely with one sheet of material Sellotape adheres to skin very firmly and a supply of sellotape should be available in all surgical theatres it is a most useful material

The use of internal sutures for closing incisions followed by an application of Nobecutane, either as a spray, or painted on, gives excellent wounds Plastic

lata strips may be useful for many other purposes also Figs 19 and 20 show a piece of fascia being removed by this method The use of animal-tail tendon from animals other than the kangaroo might well be tried in remote places

An appreciation of the value of thread as a suture and ligature material is most important Cotton thread can be purchased in almost all parts of the world, as it is a much used domestic product Practically all doctors working in the tropics have been obliged from time to time to use thread as a ligature material by compulsion rather than necessarily by choice Thread has many advantages,



FIG 19 FIG 20

Fig 19 —Fascia lata being cut by Adams fasciatome
Fig 20 —Fascia lata being removed after cutting

and if intelligently used is an excellent material in surgical work It is not suitable for suturing skin, though it can be used if nothing else at all is available, nor should it be used in the layers of the skin as a ligature material for small bleeding vessels Thread used as a skin suture material predisposes to sepsis, as the thread acts as a wick, allowing infection to enter, also it allows a leak of fat into the skin layers, this is undesirable and predisposes to keloid formation Thread should be used only in layers deep to the superficial fascia this is a good working rule If fine thread is used as a ligature material for small vessels in the deep layers of the skin, as seen in thyroid operations, the thread is very liable to ulcerate later This is most disappointing to the patient and causes a slight irregularity of the wound also, which is unsightly The thread tends to come out about eight weeks after operation, at a time when the patient should be quite well Thread can be used with impunity if it is placed deep to the superficial fascia and is also an excellent material for ligation of internal blood-vessels and tissue pedicles The first knot holds very firmly while the second loop is being made, in this respect

blood-pressure and shock may be due to the loss of whole blood or loss of serum alone, as in the case of burns The lowered blood-pressure, due to the formation of histamine, in snake-bite of the viperine type, also causes a form of shock associated with local vascular disturbance and loss of fluids into the tissues Hæmorrhage and shock though closely related are not synonymous Adequate oxygenation of the vital centres of the body is maintained by good cardiac action and an intact vascular system A patient's blood-pressure may fall although the vascular system is intact, this occurs in advanced cardiac disease, where the heart is primarily at fault In a robust young adult, where there is no previous evidence of heart disease, a lowered blood-pressure following an accident is almost invariably due to a loss of fluid from a wound or to internal hæmorrhage In cases of internal hæmorrhage the site of the loss of blood is not apparent In cases of fracture of the pelvis, there may be massive internal hæmorrhage from ruptured iliac veins and there is very marked shock If the possibility of a cardiac lesion can reasonably be excluded, as it can in most accident cases, then any fall in blood pressure may be interpreted as blood loss at some point in the body The slight temporary fall in blood-pressure immediately following an accident is probably nervous in origin and due to pooling of blood in abdominal veins due to a temporary loss of vascular tone This is of a very temporary nature and improves quickly with heat, sedatives and rest it is rather of the nature of what might be termed " physiological shock " rather than " pathological shock "

The most usual method of estimating the degree of shock present is by the use of a sphygmomanometer to ascertain the blood-pressure The average systolic blood-pressure of a healthy young adult at rest is about 115 mm of mercury The drop in the systolic blood-pressure per pint of blood lost is approximately ten points on the sphygmomanometer, this is a good working rule A patient whose systolic blood-pressure is only 105 mm of mercury following an accident has usually sustained a loss of blood to the extent of 1 pint, whether this is external or internal In such cases it is desirable to give 1 pint of blood by transfusion before performing any operation which is considered necessary If the systolic blood-pressure is only 85 mm mercury, 3 pints of blood are required before operation is performed Any patient whose blood-pressure is below 100 mm mercury may be considered to be in poor condition and should have a blood transfusion before any operation is undertaken Blood transfusion is not always possible, as no blood may be available In many cases of ruptured ectopic pregnancy the systolic blood-pressure may be as low as 75 mm of mercury If donor blood is not available in such cases, an immediate autotransfusion should be started as soon as blood can be obtained from the abdominal cavity

Although estimation of the blood-pressure and pulse-rate are usually undertaken with the patient lying horizontal in bed, this method does not give as accurate a method of estimating shock as when the " tilt test " is undertaken This test, though fundamentally the same as that used for many years, is a method of accentuating the blood-pressure and pulse-rate changes as seen in shocked patients The details will be found under the heading Extracts in Chapter 7

In all patients where hæmorrhage is noted or suspected, the blood-pressure and pulse rate should be estimated before operation of any sort is undertaken

spray materials should only be used in perfectly clean wounds Chromic catgut should be used throughout in surgery if the material is available it is much more durable than non chromicised catgut It lasts rather longer in the tissues and because of this a much finer gauge can be employed It is advisable to use catgut for skin suturing under plaster of Paris rather than insoluble monofilament nylon Although it is common to blame the catgut when a case of tetanus occurs following operation it is a rare source of tetanus On no occasion has tetanus been found in my experience following exam nation of catgut Great care is exercised by all good commercial firms to avoid the possibility of tetanus being



FIG 21

Encrus ed thread ligatures removed from fi tula case

transmitted by ligature material Having known of tetanus being found from various materials examined from the theatres in the tropics it appears that there are usually ample other sources of infection to account for cases of tetanus without blaming the catgut

TECHNIQUE OF HÆMOSTASIS

The three greatest hazards in surgery are sepsis hæmorrhage and shock Following the discoveries of Pasteur and Lord Lister sepsis has accounted for a decreas ng number of fatalities as time has gone on An apprec ation of aseptic technique has reduced the rate of sepsis to a comparatively low level The introduction of the sulpha and antibiotic groups of drugs has further lowered the rate of sepsis in surgical wounds The risk of seps s is now very small in cases of initially clean surgical wounds Many cases already infected before operation is undertaken can be controlled by drugs before surgery is embarked upon The other two hazards hæmorrhage and shock are closely linked together hæmorrhage may be termed the process of loss of blood shock is the syndrome or combination of symptoms and signs which develop as a result of loss of blood and the associated lowering of the blood pressure secondary to this The lowered

the hope that the operation may be over soon, without attending to precise hæmostasis, is an unwise procedure, unless there is a very large supply of blood available for replacement by transfusion during the operation Nothing can replace blood adequately except blood, and therefore if blood is not available for replacement, blood must be conserved at all cost, irrespective of the time it takes to do so

Certain operations are inevitably associated with a large loss of blood, such is the case with removal of a lobe of the liver The use of a diathermy in this operation markedly decreases the loss of blood Much of the liver surface bleeding can be controlled with a large hot saline pack The radicles of the hepatic veins require oversuturing with a traumatic needle and catgut The raw area cannot be closed following lobectomy, an omental pack should be applied and sutured in position Pressure is exerted on this for some minutes and the omental pack becomes adherent to the liver surface very quickly Liver lobectomy is not an unduly difficult operation, though it initially appears somewhat alarming There have been no fatalities in the limited number undertaken

Diathermy incision of the skin in tropical surgical practice is considered unsuitable as it predisposes to keloid formation Diathermy is very useful for hæmostasis internally, sealing off of vessels by application of the current through the forceps, it is also used for bladder and prostate operations by the transurethral method In any operation where a large blood loss may be anticipated it is necessary to exercise every care during operation to avoid hæmorrhage Care must be exercised in this respect regarding operations on the breast in female patients Prostatectomy in male patients may be associated with a large blood loss Removal of an elephantoid scrotum may be dangerous also for the same reason unless great care is exercised Wounds of the axilla and groin, by knives or broken glass, are fraught with great danger, sudden massive hæmorrhage may occur following dislodgement of blood clot or a foreign body, such as a piece of glass, in the wound In all operations where a large blood loss is anticipated the use of 1 in 200,000 adrenaline solution appropriately placed in the tissues is a great advantage Infiltration of the neck tissues with adrenaline solution before thyroid operations is a standard technique, but it is not so frequently used elsewhere in the body The use of adrenaline solution, however, in thyroid operations, where there is evidence of thyrotoxicosis, necessitates care Adrenalin infiltration of the skin may be dangerous in such cases, due to the patient's cardiac condition The majority of enlarged thyroid gland cases in the tropics are quite non toxic, and the removal of the mass is requested for cosmetic reasons only If adequate care and patience are exercised, the removal of enlarged thyroid masses is a very satisfactory operation It is surprising what a large thyroid mass can be removed with success under local anæsthetic The operation may take well over an hour in some cases where the mass is large and very vascular

Most doctors working in the tropics find a rather disappointingly high proportion of their early operations, performed for abnormalities of the testicle developing massive hæmatomata The insertion of a drainage tube following operations on the scrotum appears unsatisfactory Hæmatoma formation between the individual layers of the scrotum may occur in spite of the drainage tube

If a transfusion is indicated, as judged by the blood-pressure reading, and no blood is available, the use of intravenous fluids, which help to restore the blood volume and improve the patient's condition, are a benefit Intravenous saline does not sustain the blood-pressure as efficiently as a blood transfusion because of loss of the fluid excretion, but it is a considerable temporary benefit

Much more importance must be laid on the necessity of hæmostasis in areas where there are inadequate supplies of blood available for transfusion purposes than in places where there are good transfusion services Every effort should be made before operation to assess accurately the patient's position regarding his blood level It is desirable to estimate the hæmoglobin level by the simplest means possible and also to determine the blood-pressure With these two factors determined, it is easier to estimate the patient's chance of successful operation than if such examinations are neglected

It is desirable to know a patient's systolic blood pressure throughout the operation, and constant reading should be taken during an operation In order to avoid the inconvenience of repeated estimations of the blood-pressure by the stethoscope method, it is recommended that in all theatres a von Recklinghausen's oscillometer should be installed This is an aneroid type of gauge with a large clock-type face which can be permanently inserted on the theatre wall or on the anæsthetic trolley The systolic and diastolic pressures are shown by the oscillating arm of the instrument The band can be left on the patient's arm and it is necessary only to glance at the dial to get an immediate reading as to the patient's blood-pressure and condition This apparatus is most valuable The instrument is supplied by the British Oxygen Company, catalogue number MS 409, under the name "'Wall' Type Aneroid Sphygmomanometer" The cost is approximately £17 The anæsthetic trolley model is MS 409/1 This instrument is of particular value where in many parts of the tropics the anæsthetic is given by a "nurse anæsthetist" The ease with which the blood-pressure can be watched with this instrument throughout the operation is an enormous advantage

A patient's blood-pressure may vary greatly during an operation, depending on the structures which are being handled, and to an even greater extent on the rate of blood loss If a patient has a sudden large loss of blood, the blood pressure will fall rapidly and this may be extremely dangerous If, however, there is a persistent slow loss over one hour or more, shock may be much less marked One pint of blood lost over a short duration of five minutes causes infinitely more shock than the same volume lost over an hour The rate of loss of blood is very important If a patient is having a blood transfusion during an operation the rate of loss of blood can be balanced largely by the input of blood from the transfusion bottle If blood for transfusion is not available, a sudden loss of blood may be most serious and must be avoided at all costs This point arises, and judgment must be exercised in certain operations, such as during subtotal thyroidectomy There may be little loss of blood during the separation of the lateral lobes of the thyroid gland, but when the main structure is dislocated and about to be removed, there may be a large and rapid loss of blood, causing much shock It is very inadvisable to make the final step in removal of the main mass until there is adequate separation of all the lateral tissues To work quickly in

needle attached to a 10 c c syringe is suitable for this purpose Using this method the blood loss is very much reduced, and this method is undoubtedly the answer to the problem of bleeding in this operation The blood loss by this method is reduced to one fourth or one-sixth of that which otherwise might occur It is also a great advantage to let the patient's legs hang down at the sides of the table, being separated and bent at the knees This posturing of the patient causes some pooling of the blood in the legs and some reduction in the general blood-pressure By these two methods combined, the blood loss is very much reduced It is not advisable to use the hexamethonium group of drugs to lower the blood-pressure in the absence of a qualified anæsthetist, as the use of such drugs is not without danger In cases of elephantiasis of the scrotum, the use of a scrotal tourniquet should be abandoned, as it interferes with removal of an adequate amount of the elephantoid tissue, predisposing to recurrence The major bleeding in operations for elephantiasis of the scrotum is from the posterior scrotal veins

Arteriotomy before operation, as a means of lowering blood-pressure, is not recommended This method, whereby blood was first removed from an artery before operation and subsequently returned to the patient as a transfusion after the operation, was practised in some centres for a limited time as a means of [illegible] the blood pressure during operation, it is a dangerous procedure and [illegible] mmended The method has been abandoned in places where it was given a [illegible] It is mentioned because of a method bearing some resemblance to it which [illegible] ctually quite useful This method referred to may be termed de ayed at [illegible] ransfusion" It has been used and found useful in cases where a transfu [illegible] ought likely to be required during operation but where no blood is available [illegible] e week before operation is anticipated, blood is removed from the patient and [illegible] d in a refrigerator, using glucose citrate as a preservative, following thi [illegible] ing the next seven or eight days prior to operation, the patient is given large quantities of intravenous iron and a high protein diet and adequate fluids this results in a rapid formation of new blood By this means the patient's blood rises about 10 per cent, representing a gain of about 1 pint of new blood The operation is then undertaken and the patient's own blood given back by transfusion during the procedure This method may be of considerable value in cases where it is obvious that no blood can be obtained for the patient As considerable blood loss may be anticipated by the nature of the operation, the shock induced is overcome by blood replacement at a time when it is most required This is a method worthy of reflection in the tropics, it is not likely to be required where blood is available for transfusion

In some areas of the world where surgery is not popular and patients still fear hospitals to some extent, it may do much more harm than good operating on cases which have a very small chance of recovery In these " desperate cases it is advisable to be guided by the patient's blood-pressure, the hæmoglobin level and the availability of blood for transfusion It has also been found a very useful guide not to operate on a patient without a transfusion of blood if the patient's pulse rate figure is above the systolic blood-pressure figure in millimetres of mercury A low blood-pressure and a high pluse rate suggest a very poor prognosis Exceptions may occur in such cases, as with ruptured ectopic pregnancy where the blood

After several years of trial by different methods the conclusion has been reached

spinal anæsthetic needle are suitable for this purpose, as with this long needle the front, sides and back of the scrotum can be injected, as well as the layers of the spermatic cord, and the tissues down to the perineum This technique contracts the dartos muscle of the scrotum and the cremaster muscle and so tightens up the local structures as well as constricting the blood vessels locally By this means the wound can be closed quite dry If the testicle is being removed the cord should be left long in non malignant cases The section of the cord is best undertaken at the level of the lower pole of the testicle (Fig 96), after the main structure has been separated from the overlying cord By this means the cord can be tied off in about four separate sections instead of one mass ligation higher up, at the inguinal canal By the lower sectioning of the cord, the vessels are tied in smaller masses after they have divided up and there is much less tendency for ligatures to slip The pressure in the smaller vessels is lower and there is much less likelihood of hæmatoma formation Orchidectomy, with a long cord remaining in non malignant cases, gives excellent cosmetic results, as the lower end of the cord becomes rather bulbous and reproduces a contour very like a normal testicle This point of cosmosis is very gratifying to most male patients, and so is worth considering

One of the reasons for the introduction of the retropubic method of prostatectomy by Millin was for the more adequate control of bleeding Retropubic prostatectomy is less likely to be associated with post operative hæmorrhage than the open suprapubic transvesical prostatectomy method, it is, however, a slightly more difficult operation than the suprapubic method and, no doubt for this reason alone, many of the older types of operation will continue to be undertaken for enlarged prostate In order to decrease hæmorrhage following prostatectomy, Corlette [8] has advised infiltration of the periprostatic area with adrenaline solution by the perineal route before operation This procedure is not difficult to undertake, but it necessitates the patient being put in a lithotomy position It is more convenient to undertake periprostatic injection with a 1 in 200,000 solution through the suprapubic opening before the prostate is removed a long needle of the Krause type is very suitable for this purpose This needle was originally made for injection of the cœliac ganglion, before gastric operations, under local anæsthesia The needle can be passed down along the index finger in the suprapubic opening and injections made in suitable positions around the prostate through the bladder Periprostatic injection with adrenaline solution by either route, before the prostate is removed, reduces post-operative bleeding and is worthy of trial, especially in cases where the structure to be removed is likely to be very congested This technique has been found useful on many occasions

In undertaking operations for elephantiasis of the scrotum it is of great advantage to infiltrate the groin and base of the scrotum with a 1 in 200,000 adrenaline solution After injection of the front, sides and back of the scrotum the needle can be passed down to infiltrate the perineal area A spinal anæsthetic

be given quickly should it be needed Any instruments required are near at hand, they can be sterilised in the theatre which is near by The patient has not to be removed back a long distance from the ward to the theatre should the necessity arise, and so delays are prevented If a patient is returned to the ward and subsequently found to require some form of treatment urgently necessitating the use of some electrical theatre apparatus, it is not uncommon to find that there are no electrical sockets in the ward for the apparatus to be plugged into Under the circumstances it is much better to have a " recovery room " where serious cases may be placed temporarily until the general condition becomes stabilised, the pulse-rate and respirations remaining steady and of a good quality When the patient's condition has remained steady for some hours and he is considered fit to return to the general ward, he is much less likely to give rise to serious concern than if he were sent back to the ward immediately following operation

A " recovery room " should be considered in the planning of all new theatres, and two if possible, it is an essential to modern surgery The necessity for such a " recovery room " usually becomes apparent only after some unfortunate catastrophe has occurred and a patient's life lost by delay in getting suitable apparatus quickly To have such a " recovery room " in the theatre saves having a lot of emergency apparatus in various wards which may seldom be used but is required in emergency following operation The centralising of post-operative emergency equipment for the whole hospital is of great value The various electrical fittings should be capable of being plugged into suitable sockets provided for the purpose Instrument trays can be set up quickly if required, being near at hand The " recovery room " should be kept locked when not in use and the key kept by a reliable person This room should be used for in-patients only Only a small proportion of patients operated upon need to be put in the " recovery room," the majority of patients can be returned direct to the wards quite safely One such " recovery room " has been found most beneficial The room should not be used by out-patients, otherwise it is very liable to become an accessory out-patient section Out-patients requiring minor operations should be prepared in the out-patient department and sent to the theatre accompanied by a nurse, not relatives, and after operation returned to the out-patient department to rest prior to returning home accompanied by relatives

REFERENCES

1 MEDREK, T F & LITSKY, W (1957) Surgical antiseptics *Int Abstr Surg* 104, 209
2 SEPULVEDA, G & IBARRA, L M (1956) Mycostatin for the local treatment of vulvo vaginitis *J Philipp med Ass* 32 421
3 MACAFEE, C H G (1957) The changing face of obstetric practice and teaching *Cent Afr J Med* 3, 37
4 CHEN, W C (1957) Painless labour by the psychoprophylactic method *Chin med J* 75, 337.
5 HSU CHING YEH (1953) Protective sleep in abdominal surgery *Chin med J* 71, 259
6 MCLAUGHLIN, R C (1958) Personal communication
7 STEPHENS, J R (1931) Tetanus in dust *W Afr med J* 4 (old series), 97
8 CORLETTE, C E (1948) *A Surgeon's Guide to Local Anæsthesia* Bristol Wright & Sons Ltd
9 SHEN, J K, SHENG, C Y & WANG, W T (1953) Starch sponge a hæmostatic agent *Chin med J* 71, 167

pressure is undoubtedly very low and the pulse-rate high The fact that an auto-transfusion can, in most of these cases, be given makes the outlook more favourable Attention to the blood pressure helps to avoid collapses on the operating table

The use of a tourniquet in limb surgery should always be kept in mind There is often an unnecessary loss of blood from lack of this precaution when operating on arms and legs By the use of a well placed tourniquet, surgery of the limbs can be carried out much more efficiently and much more quickly and with less loss of blood Firm bandages should be applied before the tourniquet is removed A tourniquet is frequently neglected in hand surgery and this should not be so A sphygmomanometer arm band, well inflated and maintained at 200 mm of mercury level, is very useful in surgery below the elbow If a single rubber band is used, it should be placed over a folded towel to avoid pressure paresis of the radial nerve and subsequent drop-wrist A "scalp tourniquet' can be used with advantage, but it is frequently neglected, in carrying out operations on the scalp Scalp wounds bleed very freely and there may be a considerable loss of blood, which is dangerous and unnecessary There is no difficulty in applying a rubber tube tightly round the scalp a long Foley's rectal tube is quite suitable This is applied below the external occipital protuberance and round the front of the skull at the level of the eyebrows The ends are gripped by strong artery forceps to prevent slipping If the band slips below the eyebrows it may cause pressure on the eyeballs, which is undesirable and may be dangerous In order to keep the tourniquet above the eyebrow level it is necessary to insert two Moynihan's skin edge forceps through each eyebrow when the patient is anæsthetised The metal projection of the forceps prevents the rubber band slipping down into the position of the eye socket The perforation of the skin by the teeth of the forceps does not permanently damage the skin locally and keloid formation does not occur in this position, it is therefore not dangerous By using this simple method, blood is conserved in scalp operations

In patients suffering from depressed fracture of the skull it is frequently necessary to enlarge the skin wounds in order to get adequate access to the damaged bone By opening the wound further, much blood is lost if a tourniquet is not used round the base of the scalp The site of further incisions in the scalp should in addition be injected with a 1 in 200,000 adrenaline solution to avoid the starting of bleeding again following the removal of the tourniquet It is most inconvenient if the wound starts to bleed again after the sutures have been inserted and the band removed, the adrenaline prevents this in most cases A bowl with a 1 in 200,000 adrenaline solution should be placed on the instrument tray and *used as a routine In most operations it is as useful as an additional assistant,* especially in tropical areas where blood for transfusion is difficult to get, and where patients are usually found to have a hæmoglobin below that desirable for surgery

Hæmophilia seems to be rare in African patients, it has, however, been encountered Thrombin preparations used to assist the clotting of blood in operation wounds have great advantages Oxycel gauze is efficient, but it produces an unsightly sticky black mass in the area where it is applied Gelfoam is an efficient hæmostatic and its application is useful as a method of arresting oozing in the planes of the neck from which a thyroid gland has been removed, it is

be given quickly should it be needed Any instruments required are near at hand, they can be sterilised in the theatre which is near by The patient has not to be removed back a long distance from the ward to the theatre should the necessity arise, and so delays are prevented If a patient is returned to the ward and subsequently found to require some form of treatment urgently necessitating the

may be placed temporarily until the general condition becomes stabilised, the pulse-rate and respirations remaining steady and of a good quality When the patient's condition has remained steady for some hours and he is considered fit to return to the general ward, he is much less likely to give rise to serious concern than if he were sent back to the ward immediately following operation

A " recovery room " should be considered in the planning of all new theatres, and two if possible, it is an essential to modern surgery The necessity for such a " recovery room " usually becomes apparent only after some unfortunate catastrophe has occurred and a patient's life lost by delay in getting suitable apparatus quickly To have such a " recovery room " in the theatre saves having a lot of emergency apparatus in various wards which may seldom be used but is required in emergency following operation The centralising of post-operative emergency equipment for the whole hospital is of great value The various electrical fittings should be capable of being plugged into suitable sockets provided for the purpose Instrument trays can be set up quickly if required, being near at hand The " recovery room " should be kept locked when not in use and the key kept by a reliable person This room should be used for in-patients only Only a small proportion of patients operated upon need to be put in the " recovery room," the majority of patients can be returned direct to the wards quite safely One such " recovery room " has been found most beneficial The room should not be used by out-patients, otherwise it is very liable to become an accessory out patient section Out patients requiring minor operations should be prepared in the out patient department and sent to the theatre accompanied by a nurse, not relatives, and after operation returned to the out patient department to rest prior to returning home accompanied by relatives

REFERENCES

1 MEDREK, T F & LITSKY W (1957) Surgical antiseptics *Int Abstr Surg* 104 209
2 SEPULVEDA G & IBARRA L M (1956) Mycostatin for the local treatment of vulvo vaginitis *J Philipp med Ass* 32 421
3 MACAFEE C H G (1957) The changing face of obstetric practice and teaching *Cent Afr J Med* 3 37
4 CH EN, W C (1957) Painless labour by the psychoprophylactic method *Chin med J* 75 337
5 HSU CHING YEH (1953) Protective sleep in abdominal surgery *Chin med J* 71 259
6 McLAUGHLIN R C (1958) Personal communication
7 STEPHENS J R (1931) Tetanus in dust *W Afr med J* 4 (old series) 97
8 CORLETTE C E (1948) *A Surgeon s Guide to Local Anæsthesia* Bristol Wright & Sons Ltd
9 SHEN J K, SHENG C Y & WANG W T (1953) Starch sponge a hæmostatic agent *Chin med J* 71, 167

7

Abdominal Surgery

ASSESSMENT OF PATHOLOGICAL GROUPING

ABDOMINAL surgery is a very wide subject There are many excellent textbooks dealing with this subject alone written by one or many surgeons working in temperate zones Some writers have prepared complete textbooks on the pathology of individual systems alone within the abdomen It is difficult for doctors in the tropics, whose time, in most cases, is very fully occupied, to read through the large volumes of very detailed surgery devoted to the separate systems In order to guide those requiring direction in the general principles of abdominal surgery in the tropics it is necessary to point out the basic principles involved in the mechanism of disease, with special reference to the pathology produced by conditions which are found pre-eminently in tropical areas Almost all conditions found in temperate climates exist in tropical areas also, though with a somewhat different frequency There are, in addition, many conditions found which are seldom or never seen in temperate zones An additional difficulty arises in that it is usual to find that many patients admitted to hospital in the tropics are suffering from three, four or more conditions at the same time The clinical picture produced by such a combination of diseases may vary greatly and be very confusing at times The findings present in a patient suffering from four different conditions at the same time may again vary greatly depending on the degree of involvement attributed to each of the separate conditions present Ascariasis, malaria, anæmia and avitaminosis are frequently all seen in the same patient in addition to the condition for which the patient seeks treatment The presence of schistosomiasis, amœbiasis and other helminthic infections further complicates the situation

It is not always possible to decide which factor is the entity giving rise to the critical pathology which ultimately prompted the patient to come to hospital If, however, many conditions are present for a prolonged period and the patient suddenly becomes acutely ill, it can usually be assumed that the factor finally responsible for the breakdown in his health is the condition requiring immediate treatment The widespread nature of the pathology of the conditions already [illegible] five leading questions which it is wise to get into the habit of asking These are

1 What are you complaining of?
2 How long have you had it?
3 How did it start?
4 What recent development makes you seek advice?
5 What is the site of maximum discomfort?

be given quickly should it be needed Any instruments required are near at hand, they can be sterilised in the theatre which is near by The patient has not to be removed back a long distance from the ward to the theatre should the necessity arise, and so delays are prevented If a patient is returned to the ward and subsequently found to require some form of treatment urgently necessitating the use of some electrical theatre apparatus, it is not uncommon to find that there are no electrical sockets in the ward for the apparatus to be plugged into Under the circumstances it is much better to have a " recovery room " where serious cases may be placed temporarily until the general condition becomes stabilised, the pulse-rate and respirations remaining steady and of a good quality When the patient's condition has remained steady for some hours and he is considered fit to return to the general ward, he is much less likely to give rise to serious concern than if he were sent back to the ward immediately following operation

A " recovery room " should be considered in the planning of all new theatres, and two if possible, it is an essential to modern surgery The necessity for such a " recovery room " usually becomes apparent only after some unfortunate catastrophe has occurred and a patient's life lost by delay in getting suitable apparatus quickly To have such a " recovery room " in the theatre saves having a lot of emergency apparatus in various wards which may seldom be used but is required in emergency following operation The centralising of post-operative emergency equipment for the whole hospital is of great value The various electrical fittings should be capable of being plugged into suitable sockets provided for the purpose Instrument trays can be set up quickly if required, being near at hand The " recovery room " should be kept locked when not in use and the key kept by a reliable person This room should be used for in-patients only Only a small proportion of patients operated upon need to be put in the " recovery room," the majority of patients can be returned direct to the wards quite safely One such " recovery room " has been found most beneficial The room should not be used by out-patients, otherwise it is very liable to become an accessory out-patient section Out-patients requiring minor operations should be prepared in the out-patient department and sent to the theatre accompanied by a nurse, not relatives, and after operation returned to the out-patient department to rest prior to returning home accompanied by relatives

REFERENCES

1 MEDREK, T F & LITSKY, W (1957) Surgical antiseptics *Int Abstr Surg* 104, 209
2 SEPULVEDA, G & IBARRA, L M (1956) Mycostatin for the local treatment of vulvo vaginitis *J Philipp med Ass* 32, 421
3 MACAFEE, C H G (1957) The changing face of obstetric practice and teaching *Cent Afr J Med* 3, 37
4 CH EN, W C (1957) Painless labour by the psychoprophylactic method *Chin med J* 75 337.
5 HSU CHING-YEH (1953) Protective sleep in abdominal surgery *Chin med J* 71, 259
6 MCLAUGHLIN, R C (1958) Personal communication
7 STEPHENS, J R (1931) Tetanus in dust *W Afr med J* 4 (old series), 97
8 CORLETTE, C E (1948) *A Surgeon's Guide to Local Anæsthesia* Bristol Wright & Sons Ltd
9 SHEN, J K, SHENG, C Y & WANG, W T (1953) Starch sponge a hæmostatic agent *Chin med J* 71, 167

7

Abdominal Surgery

ASSESSMENT OF PATHOLOGICAL GROUPING

ABDOMINAL surgery is a very wide subject There are many excellent textbooks dealing with this subject alone written by one or many surgeons working in temperate zones Some writers have prepared complete textbooks on the pathology of individual systems alone within the abdomen It is difficult for doctors in the tropics, whose time, in most cases, is very fully occupied, to read through the large volumes of very detailed surgery devoted to the separate systems In order to guide those requiring direction in the general principles of abdominal surgery in the tropics it is necessary to point out the basic principles involved in the mechanism of disease, with special reference to the pathology produced by conditions which are found pre-eminently in tropical areas Almost all conditions found in temperate climates exist in tropical areas also, though with a somewhat different frequency There are, in addition, many conditions found which are seldom or never seen in temperate zones An additional difficulty arises in that it is usual to find that many patients admitted to hospital in the tropics are suffering from three, four or more conditions at the same time The clinical picture produced by such a combination of diseases may vary greatly and be very confusing at times The findings present in a patient suffering from four different conditions at the same time may again vary greatly depending on the degree of involvement attributed to each of the separate conditions present Ascariasis, malaria, anæmia and avitaminosis are frequently all seen in the same patient in addition to the condition for which the patient seeks treatment The presence of schistosomiasis, amœbiasis and other helminthic infections further complicates the situation

It is not always possible to decide which factor is the entity giving rise to the critical pathology which ultimately prompted the patient to come to hospital If, however, many conditions are present for a prolonged period and the patient suddenly becomes acutely ill, it can usually be assumed that the factor finally responsible for the breakdown in his health is the condition requiring immediate treatment The widespread nature of the pathology of the conditions already mentioned is such that one is compelled to approach the patient's illness from the point of the patient's immediate complaint In considering the diagnosis of an illness in any part of the world, the interrogation of a patient ultimately devolves itself into five leading questions which it is wise to get into the habit of asking These are

1 What are you complaining of?
2 How long have you had it?
3 How did it start?
4 What recent development makes you seek advice?
5 What is the site of maximum discomfort?

If a practice is made of asking all these questions as a routine on first seeing a patient, the nature of the complaint can be brought into moderately good focus very quickly. Each of the five points mentioned can be enlarged upon individually. An examination is carried out as suggested by the patient's symptoms and signs as the examination proceeds. In order to avoid missing obvious physical signs it is an excellent rule to make a limited examination of all parts of the body on first seeing the patient—the head, the arms, the chest, the abdomen and the legs. Many leading physical signs are missed by inadequate exposure of the patient and appropriate examination. To examine only the part of the body the patient complains of is quite inadequate, and this is a potent source of error in diagnosis.

The import[illegible]e of an "all-over examination" was vividly brought to notice on one o[illegible] a patient's abdomen opened because of abdominal pain of un[illegible] [illegible]as noted on opening the abdomen that there was a bony abdom[illegible]terior abdominal wall but no other evidence of disease. The [illegible] lumbar spine was noted to be irregular and thickened, no [illegible] detected and so the abdomen was closed. After the op[illegible]he patient's lumbar spine was examined and a marked [illegible]h had not previously been detected. Had this been no[illegible] doubt no operation would have been undertaken and [illegible]ently. An "all-over examination," no matter how [illegible] to prevent such errors. In tropical climates where [illegible]t is an excellent rule to expose a patient completely, [illegible]e patient as required. All patients appreciate being [illegible]e a patient fully is an enormous help.

[illegible]ere malaria occurs, about 20 per cent of the patients [illegible] [illegible]ria parasites in the peripheral blood if a careful exam[illegible] even though they have no symptoms suggestive of malaria [illegible] necessitate a prolonged examination to attain this figure, [illegible]ne.[1] In patients suffering from symptoms suggestive of mala[illegible] [illegible]are found to have parasites in the peripheral blood. Many pati[illegible] hospital seeking treatment have already taken anti-malarial dru[illegible] [illegible] cases malarial parasites are usually not found. The abdominal manifestations of sickle cell disease must constantly be kept in mind when dealing with African patients.

This chapter has been divided into many sub-sections. In each section a problem is dealt with such as one is frequently faced with in surgical wards in the tropics. The gastro duodenal dyspepsias are commonly seen in tropical areas, contrary to the teaching of twenty-five years ago when it was believed that peptic ulcers were seldom if ever found in native patients in the tropics. Such an outlook is accounted for by ignorance of the true situation. Gastric and duodenal perforations are not at all uncommon, and there is an additional number of perforations due to ascariasis and typhoid fever. Typhoid fever is a "form of dysentery" but with rather special characteristics, constipation being as common as diarrhœa in this condition. It is necessary to give some special attention to this subject. Since the introduction of the antibiotic group of drugs there has been a marked increase in the incidence of "typhoid-like conditions" due to a

7

Abdominal Surgery

ASSESSMENT OF PATHOLOGICAL GROUPING

ABDOMINAL surgery is a very wide subject There are many excellent textbooks dealing with this subject alone written by one or many surgeons working in temperate zones Some writers have prepared complete textbooks on the pathology of individual systems alone within the abdomen It is difficult for doctors in the tropics, whose time, in most cases, is very fully occupied, to read through the large volumes of very detailed surgery devoted to the separate systems In order to guide those requiring direction in the general principles of abdominal surgery in the tropics it is necessary to point out the basic principles involved in the mechanism of disease, with special reference to the pathology produced by conditions which are found pre eminently in tropical areas Almost all conditions found in temperate climates exist in tropical areas also, though with a somewhat different frequency There are, in addition, many conditions found which are seldom or never seen in temperate zones An additional difficulty arises in that it is usual to find that many patients admitted to hospital in the tropics are suffering from three, four or more conditions at the same time The clinical picture produced by such a combination of diseases may vary greatly and be very confusing at times The findings present in a patient suffering from four different conditions at the same time may again vary greatly depending on the degree of involvement attributed to each of the separate conditions present Ascariasis, malaria, anæmia and avitaminosis are frequently all seen in the same patient in addition to the condition for which the patient seeks treatment The presence of schistosomiasis, amœbiasis and other helminthic infections further complicates the situation

It is not always possible to decide which factor is the entity giving rise to the critical pathology which ultimately prompted the patient to come to hospital If, however, many conditions are present for a prolonged period and the patient suddenly becomes acutely ill, it can usually be assumed that the factor finally responsible for the breakdown in his health is the condition requiring immediate treatment The widespread nature of the pathology of the conditions already mentioned is such that one is compelled to approach the patient's illness from the point of the patient's immediate complaint In considering the diagnosis of an illness in any part of the world, the interrogation of a patient ultimately devolves itself into five leading questions which it is wise to get into the habit of asking These are

1 What are you complaining of?
2 How long have you had it?
3 How did it start?
4 What recent development makes you seek advice?
5 What is the site of maximum discomfort?

by Broadbent and Reiff[4] An interesting extract from their article is added, as it may be useful in indicating the method of testing for this vegetable poison No doubt the condition occurs in other areas from time to time where yams are eaten The coral plant of the family Jatropa is also quite poisonous The Jengholt bean of Java, botanically known as *Pithecolobium lobatum*, is known also to be dangerous if eaten There are many other poisonous plants, which usually cause diarrhœa, vomiting and collapse

Entamœba histolytica not only gives rise to the intestinal forms of disease with colitis, ulcerative proctitis and amœboma formation within the bowel, but sometimes lesions on skin surfaces about the perineum The female external genital organs may sometimes be affected with amœboma formation The uterine cervix is on occasions involved, giving rise to appearances closely simulating carcinoma of the cervix (Misra The seriousness of amœboma at this site can be judged when it is realised that a grave error may occur in mistaking the condition for a carcinoma Such an error has been known to occur with the true diagnosis, only being detected after m roscopic examination of the specimen following total hysterectomy

Hepatitis f ı subacute type may be due to *E histolytica* In some cases a history c k of diarrhœa is given, in other instances it seems that the pat r re of having had any bowel disturbance If amœbic hepatitis ı n ı reated at an early stage *abscess formation may occur* within th ıa iver, and pus collecting under the diaphragm may rupture ir ı or into the pericardium on the left side Such extensions e ery serious complications If an abscess of the liver ruptures int ı ɛ vity the condition is associated with marked shock and is usually *h cases have been seen—both fatal*

Sigmoid ı of examination much more frequently required in tropical temperate areas This examination is used in all countries of malignant and benign growths of the rectum and sigmoid d countries it is necessary to use a sigmoidoscope in addition in c ıasis or any of the intestinal forms of schistosomiasis are suspected s may in some cases be detected on direct microscopic examination ool The differential diagnosis of intestinal carcinoma, amœboma an matous tissue produced by the schistosome group of diseases requ s ver ar ul judgment In all cases of a mass in the large bowel in patients in a tropical country every effort must be made to differentiate accurately between the three conditions before surgery is embarked upon Some cases of amœboma have been operated upon in temperate zones in the case of patients returning from the tropics who were believed to have a carcinoma of the colon present On examination of the specimen removed the microscopic findings revealed the true nature of the pathology, the condition being due to *E histolytica* and not carcinoma Such an error might similarly occur in cases of schistosome masses in the large bowel, though no such error has been noted in the literature Cases of amœboma and schistosomiasis are eminently suitable for treatment by specific drugs without undertaking any surgery in most cases only if urgent obstructive signs occur is surgery necessary

massive intestinal infection by the pyocyaneus type of germ Gamble and Harris[2] report such a case, giving details of the clinical findings and bacteriological examinations Holgate,[3] also working in West Africa, reported a further fatal case of the same nature with fever, diarrhœa and abdominal pain—the clinical picture closely simulating typhoid fever in some respects

Whereas the outlook in the bacillary dysentery group of diseases has greatly improved since the introduction of the sulpha type of drugs, there has been quite a serious rise in the incidence of the forms of dysentery associated with the free use of antibiotic drugs The tetracycline group of drugs are most likely to cause this serious type of enteritis Histoplasmosis involving the intestinal tract have been recognised much more frequently in tropical countries in the past ten years than previously The intestinal tract is not infrequently involved in this condition, and the possibility of histoplasmosis of any part of the intestinal tract should be kept in mind in obscure cases associated with chronic diarrhœa The subject of histoplasmosis is discussed elsewhere under Infections and Ulceration

Peritonitis in African patients appears to be more dangerous than it is in patients in Europe Whether this is due to the late arrival of patients at hospital or otherwise is not certain Many patients admitted to hospital suffering from abdominal complaints are further burdened by the addition of the effects of a native enema Such an enema is prepared with various irritant herbs and on being given per rectum produces a marked proctitis and pelvic peritonitis The paralytic effect on the bowel caused by the irritation of the enema produces marked distension of the abdomen Patients with abdominal pain and paralytic distension of the bowel should be questioned about such treatment The condition occurs frequently in some areas and not at all in others The insertion of irritant vaginal tampons in female patients also gives rise to serious pelvic inflammation in some districts with marked local inflammation and ulceration followed by late vaginal stricture formation

There are many forms of acute enteritis, most of them due to bacterial infection Some cases of acute enteritis may be due to poisonous materials ingested or drunk by mistake There have been many deaths due to *ackee* fruit sickness in the West Indies and also in West Africa Almost all cases of *ackee* fruit sickness occur in children between the ages of 3 and 6 years These tiny children, who are old enough to get away from the care of their mothers, are too young to appreciate the fact that the unripe fruit is poisonous while the ripe fruit is not poisonous With this sickness there is vomiting and diarrhœa and collapse, the patients fall asleep in a weak condition and cannot be wakened the next morning The use of cortisone is suggested as likely to be of benefit in treatment of the condition The essential poison of *ackee* fruit is a glucoside saponin, not very unlike that produced by the cobra mamba type of snakes in which cortisone is of great benefit In India many cases of poisoning have been caused by *Latyrus sativa* The content of hydrocyanic acid in some forms of cassava gives rise to abdominal symptoms if this foodstuff is not adequately cooked Boiling this substance seems to detoxicate it If it is eaten raw or inadequately cooked it is dangerous The eating of poison yam of the type *Dioscorea dumetorum* has occurred on many occasions in Africa, sometimes with fatal results, as reported

by Broadbent and Reiff[1] An interesting extract from their article is added, as it may be useful in indicating the method of testing for this vegetable poison No doubt the condition occurs in other areas from time to time where yams are eaten The coral plant of the family Jatropa is also quite poisonous The Jengholt bean of Java, botanically known as *Pithecolobium lobatum*, is known also to be dangerous if eaten There are many other poisonous plants, which usually cause diarrhœa, vomiting and collapse

Entamœba histolytica not only gives rise to the intestinal forms of disease with colitis, ulcerative proctitis and amœboma formation within the bowel, but some times lesions on skin surfaces about the perineum The female external genital organs may sometimes be affected with amœboma formation The uterine cervix is on occasions involved, giving rise to appearances closely simulating carcinoma of the cervix (Mi r) The seriousness of amœboma at this site can be judged when it is realised th t a grave error may occur in mistaking the condition for a carcinoma Such an err r has been known to occur with the true diagnosis, only being detected aft r m roscopic examination of the specimen following total hysterectomy

Hepatit s t ubacute type may be due to *E histolytica* In some cases a histc ⟨ of diarrhœa is given, in other instances it seems that the p e of having had any bowel disturbance If amœbic hepatitis eated at an early stage abscess formation may occur within th iver, and pus collecting under the diaphragm may rupture or into the pericardium on the left side Such extension ery serious complications If an abscess of the liver ruptures ir ity the condition is associated with marked shock and is usua cases have been seen—both fatal

Sigmoi of examination much more frequently required in tropical temperate areas This examination is used in all countries of malignant and benign growths of the rectum and sigmoid countries it is necessary to use a sigmoidoscope in addition in c iasis or any of the intestinal forms of schistosomiasis are suspected may in some cases be detected on direct microscopic examination ol The differential diagnosis of intestinal carcinoma, amœboma a th matous tissue produced by the schistosome group of diseases requ ics ver ar ul judgment In all cases of a mass in the large bowel in patients in a tropical country every effort must be made to differentiate accurately between the three conditions before surgery is embarked upon Some cases of amœboma have been operated upon in temperate zones in the case of patients returning from the tropics who were believed to have a carcinoma of the colon present On examination of the specimen removed the microscopic findings revealed the true nature of the pathology, the condition being due to *E histolytica* and not carcinoma Such an error might similarly occur in cases of schistosome masses in the large bowel, though no such error has been noted in the literature Cases of amœboma and schistosomiasis are eminently suitable for treatment by specific drugs without undertaking any surgery in most cases only if urgent obstructive signs occur is surgery necessary

Surgery should be avoided at all costs, if at all possible, in these two conditions The tumour mass produced by each of the three conditions is confined almost exclusively to the large bowel The distribution of the lesions in each case is very similar

Intestinal obstruction and obstetrical obstruction are the two main conditions which junior medical officers working on their own for the first time find are their greatest cause of concern The various forms of each condition require considerable skill and judgment in dealing with them efficiently

Fæcal fistulæ of different sorts are much more commonly seen in tropical countries than in temperate zones This may be due to the late stage at which patients come to hospital for treatment in many cases Fæcal fistulæ may be internal between various structures External fæcal fistulæ are more common, and are seen most usually in cases of late neglected inguinal hernia, usually of the Richter type With the onset of gangrene of the gut and infection of the superficial tissues a fistula is produced in the upper part of the scrotum

All forms of fungoid growth are prone to fistula formation If a fistula is found to be associated with an underlying mass, fungus conditions should be looked for in the granulation tissue presenting in the fistula Tuberculosis and actinomycosis are seen to give rise to fistula formation in the cæcal area, especially after appendicectomy, if the condition giving rise to the symptoms was of this origin Histoplasmosis, torulosis and maduamycosis have all been reported in the form of bowel infections These are rare conditions but they should be kept in mind

Because of the high rate of lorry accidents in many parts of the tropics there is a very high rate of abdominal injuries associated with internal hæmorrhage Rupture of the spleen is much more common in the tropics than it is in temperate zones The spleen in most patients is enlarged to some extent, and rather more friable than in patients in Europe, this is due largely to the high incidence of chronic malaria Fracture of the pelvis with internal hæmorrhage, secondary to tearing of iliac veins, is very commonly seen There is frequently massive internal hæmorrhage from this cause Most of the extravasated blood is found in the cellular planes of the pelvis and retroperitoneal in position

Ectopic pregnancy is the commonest cause of internal hæmorrhage in female patients in the tropics Following rupture of the Fallopian tube due to this cause there is frequently a massive internal hæmorrhage This condition is very commonly seen in all the large towns, but less commonly in country areas

The pathology seen in tropical countries tends to be more advanced than that seen in temperate areas Patients come to hospital at a much later stage of disease Many patients with enormous abdominal tumours without gut obstruction come to hospital for treatment The size of a tumour is not the main factor determining the difficulty in removing it but rather the degree of fixity to other structures Many patients with very large abdominal tumours have very few symptoms and are often little inconvenienced other than by the size of the mass present If the tumour is uniform in shape and symptoms are few the condition is frequently found to be due to a cyst of some sort Ovarian cysts reach enormous proportions

Intra abdominal guinea-worm cysts may also become very large Fig 22 shows a guinea-worm cyst between the layers of the mesentery In areas where dracunculosis is found enquiries should be made regarding guinea-worm infection in all cases where a cystic tumour is found, whether the mass is in the abdominal wall or chest wall or within the abdomen Guinea worm cysts are most commonly noted on the posterior aspect of the body About the apex of the scapula is the most common site to find these cysts, but they may occur elsewhere These cysts are usually noted about two years after the initial infection with guinea worm The primary worm usually infects the lower limb Calcified guinea worms are frequently noted in X-ray photographs, about the legs and pelvis are the most usual areas to note these shadows of calcified worms Hydatid cysts may occur in any organ of the abdomen They usually cause few symptoms until they are

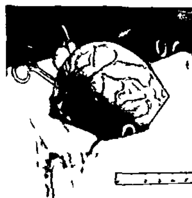




FIG 22 FIG 23

Fig 22 —Large intra mesenteric cyst due to guinea worm (Scale in inches)
Fig 23 —Gall bladder with gall stones removed from African patient

quite large unfortunately They are often multiple, and it is frequently not possible to remove them complete

There has been much discussion as to the reason why gall stones are seldom seen in African patients Gall stones are not very common but they do occur Fig 23 shows a gall-bladder containing gall stones removed from a middle-aged woman One case of gall stones was seen in a small girl aged only 12 years and the gall bladder was removed, it contained many stones—this is most unusual Cholecystitis and gall-stones are commonly seen in the Bengal provinces of India

[illegible]
[illegible]
cysts containing opaque material in them can frequently be [illegible] examination If a large abdominal tumour is present within the abdominal cavity and all forms of X-ray examination appear to be negative, the condition frequently turns out to be a benign condition, such as a cyst of some sort or a fibroid of the uterus of an unusual nature

The possibility of a full term extra uterine pregnancy must be kept in mind constantly as it is a condition much more frequently seen in tropical countries than

Surgery should be avoided at all costs, if at all possible, in these two conditions The tumour mass produced by each of the three conditions is confined almost exclusively to the large bowel The distribution of the lesions in each case is very similar

Intestinal obstruction and obstetrical obstruction are the two main conditions which junior medical officers working on their own for the first time find are their greatest cause of concern The various forms of each condition require considerable skill and judgment in dealing with them efficiently

Fæcal fistulæ of different sorts are much more commonly seen in tropical countries than in temperate zones This may be due to the late stage at which patients come to hospital for treatment in many cases Fæcal fistulæ may be internal between various structures External fæcal fistulæ are more common, and are seen most usually in cases of late neglected inguinal hernia, usually of the Richter type With the onset of gangrene of the gut and infection of the superficial tissues a fistula is produced in the upper part of the scrotum

All forms of fungoid growth are prone to fistula formation If a fistula is found to be associated with an underlying mass, fungus conditions should be looked for in the granulation tissue presenting in the fistula Tuberculosis and

the form of bowel infections These are rare conditions but they should be kept in mind

Because of the high rate of lorry accidents in many parts of the tropics there is a very high rate of abdominal injuries associated with internal hæmorrhage Rupture of the spleen is much more common in the tropics than it is in temperate zones The spleen in most patients is enlarged to some extent, and rather more friable than in patients in Europe, this is due largely to the high incidence of chronic malaria Fracture of the pelvis with internal hæmorrhage, secondary to tearing of iliac veins, is very commonly seen There is frequently massive internal hæmorrhage from this cause Most of the extravasated blood is found in the cellular planes of the pelvis and retroperitoneal in position

Ectopic pregnancy is the commonest cause of internal hæmorrhage in female patients in the tropics Following rupture of the Fallopian tube due to this cause there is frequently a massive internal hæmorrhage This condition is very commonly seen in all the large towns, but less commonly in country areas

The pathology *seen in tropical countries tends to be more advanced than that* seen in temperate areas Patients come to hospital at a much later stage of disease Many patients with enormous abdominal tumours without gut obstruction come to hospital for treatment The size of a tumour is not the main factor determining the difficulty in removing it but rather the degree of fixity to other structures Many patients with very large abdominal tumours have very few symptoms and are often little inconvenienced other than by the size of the mass present If the tumour is uniform in shape and symptoms are few the condition is frequently found to be due to a cyst of some sort Ovarian cysts reach enormous proportions

are of long duration Sickle cell disease may give rise to abdominal *symptoms* as already mentioned With patients of African origin this condition must be remembered especially when acute abdominal symptoms occur

In considering cases of volvulus and abdominal distension the possibility of distension of the abdomen being associated with a pre-uræmic condition in elderly men is worthy of note Such cases are frequently found to have a hiccough and to have gone on for longer than is the case in patients suffering from volvulus of the sigmoid colon

GASTRO-DUODENAL DYSPEPSIA

In medical teaching centres much emphasis is laid upon the close association between mental stress and activity on the one hand and peptic ulceration on the other The indirect inference is drawn that those who usually live at a lower mental tempo seldom if ever develop peptic ulcers This impression is quite wrong Verwilghen [7] considers that peptic ulcers are as common in the peoples of the Kwango district of Belgian Congo as elsewhere in the world One hundred and sixty-seven operations were undertaken for dyspeptic conditions in five years in this district (1951-56) To assume that those who live in tropical countries necessarily do live at a lower mental tempo is also an assumption which may not necessarily be correct It is very difficult to estimate the mental activity or degree of stress under which another community lives All forms of gastro-duodenal pathology noted in temperate climates also occur in tropical zones Without figures at hand to present an accurate statement the impression is gained, from some years of experience in tropical countries, that the incidence of gastric ulceration and ulcer of the duodenum is approximately 50 per cent of that seen in Europe The same applies to carcinoma of the stomach Duodenal ulceration is more common than gastric ulceration The incidence of peptic ulcer is much greater in males than females Chronic gastritis is also seen, many of the cases being associated with the injudicious use of locally made alcohol Local gastric fibrosis with partial pyloric obstruction occurs in late cases following healing of gastric ulcers

A condition not frequently seen in Europe but not uncommonly noted in Africa is the occurrence of duodenal ulcer in children between the ages of 10 and 15 years Few gastric or duodenal ulcers are noted in patients in Europe under the age of 20, after that age the incidence increases rapidly The possibility that such duodenal ulcers in African children may be precipitated by the presence of ankylostomiasis has been considered but this is difficult to prove It is wise to treat such cases for helminthic infections in addition to medical measures which may be advised One is reluctant to undertake major gastric surgery in patients below the age of 25 years Duodenal ulceration in children was first appreciated when on two occasions a laparotomy was undertaken for persistent epigastric pain of a severe nature in two children, both boys between the ages of 12 and 14 years, with duodenal ulcers It is advisable to undertake gastric analysis for patients with dyspeptic symptoms In some dyspeptic cases it is found that there is an absence of free hydrochloric acid, contrary to what might be expected Gastric

in temperate areas of the world Most of these cases are operated upon in the expectation of a large uterine fibroid being removed, and it is only as the operation proceeds that the true nature of the condition is fully appreciated The most valuable method of finding out if a full term pregnancy is in the uterus or extra-uterine is by doing a lateral X-ray of the abdomen, and if any part of the fœtal skeleton is behind the anterior aspect of the maternal lumbar spine the pregnancy is certain to be extra-uterine This is a most valuable observation, pointed out by Feeney[6] The subject of ectopic pregnancy will be dealt with at some length in Chapter 15

Bezoar formation is seen from time to time, an impacted mass of vegetable material usually being present Hair bezoar is less common in the tropics than the vegetable type The chronicity of the tumour and the fact that it "pits on pressure" make the condition not difficult to diagnose Megacolon, or Hirschsprung's disease, in children is much more common in the tropics than in temperate climates

The diagnosis of pelvic tumours in female patients is usually not difficult The fact that chorion epithelioma is much more common in the tropics than in temperate climates makes it necessary to keep it constantly in mind In any case, where there has been an interruption of a pregnancy, and subsequently there is abnormal bleeding per vaginam or an enlargement of the uterus following the termination of the pregnancy, the condition should be suspected The outlook in this condition is very bad as the patients often neglect to have treatment at an early stage The subject is referred to under Chapter 14 dealing with antenatal clinic work

In patients suffering from the late and painful stages of malignant disease, where pain cannot be adequately relieved by sedatives and the prognosis appears to be hopeless, the growth having extended beyond the confines of the primary site, it is well worth considering the operation of pre-frontal leucotomy This operation is an easy one to perform and it gives most gratifying results There may be some incontinence of urine for the first two weeks following operation, but the patient usually gains control again and is then easy to manage There is a marked alteration in the patient's mentality The patient becomes rather like a young child who laughs easily and is rather docile There is, however, a dramatic relief of pain which is a tremendous benefit to both the patient and the relatives, who are naturally greatly disturbed by the unrelieved distress of a member of the family The operation should be done only after a limited explanation of its nature is given to the patient and the relatives The legal implications should be considered where this is necessary, as the patient's power of judgment is altered by the operation

Abdominal injuries are dealt with under the section on Traumatic Surgery Gunshot wounds and knife wounds of the abdominal wall need to be operated upon in almost all cases where the abdominal wall has been penetrated into the peritoneal cavity There may be rare exceptions where the injury is by a pellet entering th [illegible]

The [illegible] to chest disease must be [illegible] conditions which

growths in the liver or much enlargement of glands locally suggests that even marked thickening about a chronic ulcer may be of inflammatory origin and not neoplastic Several cases have been operated upon which looked to be malignant but on section there was no evidence of carcinoma found On observing such cases for several years following operation, there has been no indication that the cases were malignant Microscopic diagnosis is much more accurate than the clinical appearance If a reasonable specimen is submitted for examination the pathological findings are usually very reliable Malignancy is seldom missed in a malignant case

Hæmatemesis is a serious complication of gastric ulcer In most cases where a hæmatemesis has taken place operative treatment of the ulcer should be seriously considered From cases observed it seems that hæmatemesis from



FIG 24



FIG 25

Fig 24 —Partial gastrectomy specimen showing gastric ulcer
Fig 25 —Partial gastrectomy specimen showing gastric carcinoma

gastric ulcer is usually much more severe than hæmatemesis from carcinoma of the stomach In a patient who vomits blood, the possibility of portal hypertension must be considered A combination of a good history of the case where hæmatemesis has taken place, the physical examination and barium X-ray photographs of the œsophagus, the stomach and duodenum are usually sufficient to determine the nature and the site of the bleeding Portal hypertension is considered later with its associated pathology

Joly,[10] working in Nigeria, noted that there is a marked preponderance of duodenal ulcer over gastric ulcer there The preponderance of duodenal ulcer over gastric ulcer was very obvious Peptic ulcer was almost exclusively confined to male patients In his series in Nigeria a high proportion of the duodenal ulcers were on the posterior duodenal wall and perforation was seldom noted

In patients in tropical countries there appears to be much greater difficulty in getting a history where there is a definite relationship between the peptic pain and the time of taking food The difficulty may be due partly to lack of understanding of the patient's language, but even where the patient knows the language of the doctor there still seems to be difficulty in getting a clear-cut indication of

analysis is very much easier to undertake if the small stomach tube is passed through the nostril rather than through the mouth To spray the nose with 4 per cent cocaine solution before the tube is passed is a help

Peptic ulcer tends to be much more frequently seen in South India than in North India Patal,[8] working in India, investigated the incidence of peptic ulceration at autopsy, he compared the incidence in various countries with that found in India The following figures are given

Germany (Stahl), 2 16 per cent positive for ulcer
England (Brinton), 5 per cent positive for ulcer
U S A (Portis), 4 9 per cent positive for ulcer
India (Patal), 3 3 per cent positive for ulcer

Peptic ulcers are not uncommon in patients in the tropics At a medical meeting for local doctors in a large West African town, without difficulty eight patients were brought from the wards each suffering from a gastric or duodenal complaint Gastric ulcer, gastric carcinoma and partial pyloric stenosis due to old ulcer fibrosis were shown as well as cases of duodenal ulcer in adults and children Some of the patients had been operated upon and others were being prepared and awaiting operation The conditions were confirmed in all cases operated upon From investigations carried out there was little doubt as to the diagnosis of those not yet operated upon X-ray photographs and gastric analysis substantiated the clinical findings Two photographs (Figs 24 and 25) show partial gastrectomy specimens—one removed for gastric ulcer and the other because of carcinoma of the stomach

Edington,[9] examining post-mortem material and comparing the results with figures given for East Africa and West Africa, found that carcinoma of the stomach represented a fair proportion of all malignant growths in African patients The following figures indicate the percentage incidence of gastric carcinomata relative to total carcinoma

Gold Coast, 3 6 per cent
Uganda, 3 1 per cent
Nigeria, 2 2 per cent
French West Africa, 2 3 per cent

It can be taken that the figure for carcinoma of the stomach relative to total carcinoma in African patients is about 3 per cent Only a small proportion of gastric ulcers become malignant The figure is in the level of 2 to 3 per cent

It may be difficult to differentiate between chronic gastric ulcer and early carcinoma If a palpable mass is detected in the epigastrium due to a growth of the stomach, the condition can be concluded to be at a fairly advanced stage In some cases, however, there may be palpable thickening about an ulcer of the stomach without malignancy having supervened A marked increase in gastric symptoms and a low gastric acid suggests the onset of a malignant change in a chronic ulcer of the stomach At operation in non-malignant cases there is usually some enlargement of the lymphatic glands close to the growth, which does not necessarily indicate malignancy There might well be some glandular enlargement expected due to chronic sepsis in the ulcer The absence of secondary

was an extensive infection throughout the body Actinomycosis of the stomach may also be noted on rare occasions The object of mentioning these rather rare conditions is to impress on those undertaking gastric surgery that the microscopic pathology of all gastric lesions removed at operation should be confirmed by microscopy If the less rare conditions are not looked for their presence will not be suspected on subsequent occasions All forms of fungoid pathology are tending to become somewhat more common since the introduction of the antibiotic group of drugs, and they should not be forgotten in considering any form of tumour formation

The possibility that epigastric pain complained of may be due to pathology elsewhere than in the stomach should be remembered In a patient complaining of epigastric pain who has a normal X-ray appearance of stomach and duodenum, and a normal gastric analysis is also found in the case, the possibility that the pain is of a referred nature must be considered Chest conditions such as pulmonary tuberculosis should be considered One patient for whom a partial gastrectomy was performed for a large gastric ulcer was found, following operation, to develop offensive sputum one week later, and on examination of this material tubercle bacilli were found The patient was not noted to have any chest symptoms before operation and was not coughing He must have had both a gastric ulcer and pulmonary tuberculosis before operation This was a serious oversight No doubt the general anæsthetic given aggravated the lung condition He died two months later from fulminating pulmonary tuberculosis In such a case it is difficult to know how much of the epigastric symptoms were due to the gastric ulcer and how much may have been due to the chest condition

It is difficult for a patient whose economic circumstances are poor to give adequate attention to instructions recommended in the treatment of peptic conditions In these circumstances it may be advisable in many cases not to wait unduly long in the hope that healing will take place with medical treatment and remain permanent It may be permissible to undertake partial gastrectomy at a much earlier stage under the circumstances than might be considered where the economic circumstances are more favourable, with the possibility of adequate attention being given to medical measures Medical treatment for gastric and duodenal ulcers gives excellent results if it can be carried out adequately and fully This is seldom possible in patients in tropical countries due to the nature and method of preparation of the diet locally Patients in many instances live a long distance from hospital and prolonged regular medication is impracticable Fresh milk is usually not freely available The general circumstances tend to be unfavourable for satisfactory medical treatment of confirmed ulceration of the stomach or duodenum The more radical surgical methods are therefore in many cases more suitable in a higher proportion of cases than might be considered for operation in a temperate climate

The results of partial gastrectomy are extremely good if undertaken at a reasonably early stage Many doctors who have not undertaken this operation may hesitate to embark on a procedure which appears to be a very major undertaking The operative mortality for partial gastrectomy with average skill should not exceed 5 per cent A gastro-enterostomy is a much simpler operation

periodicity of the pain relative to food taken In many cases it is remarkable how little pain the patient complains of considering the extent of ulceration found at operation Patients who take a diet of large volume but low calorie value, as is very usual in tropical countries, appear to get less pain associated with the various forms of peptic ulceration than those where the volume of food taken is smaller but of a higher calorie value

The question may be asked, Why does a person vomit? There are many precipitating causes of vomiting derived from all parts of the body Any factor which interferes with the normal mechanism of peristalsis precipitates vomiting Any gastric lesion may interfere with the normal mechanism of emptying the stomach, this produces a retention of foodstuff or a hold-up in the removal of secretion locally produced If food is taken and the stomach will not empty normally, a sense of nausea is induced Sooner or later vomiting occurs with much relief of the symptoms If for any reason there is a degree of intestinal obstruction present, there may be reversed peristalsis and the stomach fill from below upwards The emptying of the stomach by gastric suction in such cases prevents vomiting and is a great relief to the patient in these cases

The dyspepsia of children is not infrequently due to a heavy infection of ascaris worms in areas of the world where this condition is hyperendemic The degree of partial obstruction in the jejunum which is associated with heavy infestations of ascariasis may be the cause of this form of vomiting Partial obstruction of the large bowel causes very little vomiting A patient may vomit once or twice at the onset of an acute large bowel obstruction, as with volvulus cases, due to the sudden acute pain, but the vomiting seldom continues

Foreign bodies in the stomach give rise to remarkably few symptoms in most cases The majority of foreign bodies which are small enough to enter the stomach through the œsophagus can usually be passed through the pylorus into the duodenum, and so proceed in the distal direction It is seldom necessary to open the stomach for the removal of a foreign body Most cases of foreign body in the stomach are noted in small children, these children do not worry over the foreign body swallowed, the mother does the worrying Swallowing of foreign bodies by adults is usually associated with mental derangement and the foreign bodies swallowed are multiple Recently in England a patient had multiple foreign bodies removed from the stomach, the total weight of metal coins removed was 5 lb 1 oz he had been swallowing foreign bodies for years but had remarkably few symptoms Many coins and some pieces of wire were removed Although it is wiser to have the patient in hospital if a foreign body enters the stomach, in most cases the foreign body is passed without difficulty Early operation should not be undertaken unless acute symptoms occur

On rare occasions fungoid tumours may be found in the stomach Lie Kian-Joe,[11] working in Indonesia, reported a tumour of the stomach of the Phycomycete type, the nature of the pathology was confirmed microscopically Torulosis is a fungus condition which may simulate carcinoma in any part of the intestinal tract Schwarz[12] reports a case of torulosis in the intestinal tract It may occur at any location Histoplasmosis, also a fungoid type of disease, has been noted in the intestinal tract Davies[13] reports a fatal case in a child from Kenya There

origin should be kept in mind, as previously mentioned Almost the entire intestinal tract is covered by the peritoneum, there are a few areas, however, which are covered only on part of the circumference of the bowel The duodenum, the cæcum, part of the ascending colon and rectum are covered only in part by the peritoneum, these structures being to some extent attached direct to the posterior abdominal wall Duodenal ulcers situated on the posterior duodenal wall seldom perforate, as noted by Joly[10] in Nigeria Many ulcers of the cæcum also are situated on the posterior wall of that structure and are not in direct contact with the peritoneal cavity, they therefore do not often perforate The rectum is covered only partly by the peritoneum in the middle and upper third, the remaining areas are totally extraperitoneal All intestinal perforations are secondary to some form of ulceration, gangrene or trauma A high proportion of the intestinal perforations occurring in temperate climates are due to peptic ulceration of the stomach and duodenum A limited number are secondary to malignant disease of the intestinal tract In few instances in civil life does trauma account for intestinal perforation in these areas Peptic ulceration is somewhat less common in tropical than in temperate zones, the incidence varies no doubt greatly from place to place The smaller number of perforations of gastro-duodenal lesions is more than overbalanced by the large number of perforations due to other causes

Ascariasis accounts for a high proportion of perforations in young subjects Fig 26 shows an ascaris-worm perforation of the ileum When the abdomen was opened in this case a worm was found in the perforation, the worm was removed before the camera was available with which to take the photograph We did not feel justified in putting back the worm for the sake of the picture—the worm had already been thrown in the bucket, it is therefore not shown The induration about the base of a perforation of the stomach or duodenum can almost invariably be felt at operation A very high proportion of peptic perforations are due to ulcers of stomach or duodenum Gastric perforation does not commonly occur after malignancy has intervened, as there is usually an extensive reaction in the area which decreases the likelihood of perforation Malignant disease in the duodenum is extremely rare

The maximum site of infestation by ascaris worms appears to be the second stage of the jejunum, but in spite of this fact, perforations by ascaris worms occur much more distally Ascaris-worm perforation usually occurs in the middle [illegible] loop of gut in which the perforation occurs It is important in [illegible] of peritonitis in children, which are thought to be due to an ascaris-worm perforation, to find exactly where the pain first started This gives a good indication of the nature of the perforation Most cases of ascaris perforation come into hospital three or four days after the initial pain—not immediately It seems that ascaris perforations are initially small in size, giving rise to a limited leak of intestinal contents The peritonitis may later become generalised and the pain become diffuse Frequently an abscess is formed in the pelvis or at the site of the perforation

to undertake but it is not suitable in most cases for active gastric or duodenal ulceration It is eminently suitable for patients who have had an ulcer which is now healed but leaving some degree of pyloric stenosis after it and thereby causing a low-grade obstruction to the outlet of food with slow emptying from the stomach It is seldom necessary to undertake a partial gastrectomy in patients under the age of 25 years though in a small number of cases it may be desirable It is also inadvisable to undertake this operation in patients over the age of 60 years unless it is for cases of malignant disease The operative mortality rises rapidly after the age of 55 Between the ages of 25 and 55 the prognosis is good if the patient's general condition is good before operation is performed

Gastric and duodenal hæmorrhage are seldom fatal on their first occurrence, but if a hæmorrhage from either site occurs a patient should seriously consider having a partial gastrectomy done A recurrence of the hæmorrhage is very likely Gastric or duodenal perforation is a very serious complication Many patients in the tropics arrive late following peptic perforation, as they live long distances from the hospital and transport is difficult to get in some places Patients also do not appreciate the gravity of the condition nor the time factor involved in attaining a favourable operative result in this condition Gastric and duodenal pathology is usually associated with symptoms in the epigastric area over a long time Disease elsewhere in the abdomen gives rise to sudden severe epigastric pains Appendicitis, strangulated hernia and band obstruction all give rise to acute gastric symptoms, but there is usually no previous history of vomiting or pain Consideration is given to such conditions later in this chapter

If patients suffer from gastric symptoms for more than twelve months it is usually because they are unable or unwilling to have medical treatment for one reason or another In such cases they are often much better operated upon unless their circumstances and conditions of life can be altered radically by other means, which is not very likely In undertaking gastric operations of a non-urgent type, adequate time and care should be devoted to the preparation of the patient before operation

Parasitic infections of all sorts need to be treated Gastric surgery should not be undertaken unless the hæmoglobin is at least 70 per cent This may necessitate a blood transfusion in some cases before operation In some cases the patient can wait for the blood to rise to this level with treatment Where a hæmorrhage has taken place from a peptic ulcer it may be desirable to give a blood transfusion and undertake the operation at an early stage for fear of a recurrence of the hæmorrhage

INTESTINAL PERFORATIONS

An intestinal perforation of any sort is an extremely serious condition, irrespective of the site of the perforation When the term "perforation" is used the usual inference is drawn that the perforation is between the lumen of the intestine and the peritoneal cavity Most perforations of the gut are of this nature The possibility of a board-like rigidity of the upper abdominal muscles, simulating an intestinal perforation, being caused by a sickle cell crisis in patients of African

band Many such cases have been seen The presence of a peculiar jelly like substance on the surface of the small intestine in the area about the adhesions suggests that with the leak of intestinal contents which may be presumed to have occurred there has been an escape of mucus forming cells and these have subsequently continued to form small quantities of mucus in the area

In cases of appendicitis with gangrene there is a form of perforation of the gut present, in such cases there is seldom evidence of free gas in the peritoneal

seen in patients suffering from advanced tuberculosis of the lungs with secondary infection of the intestinal tract The patients are generally in a very late terminal *condition with diarrhœa and emaciation* Patients who perforate a tuberculous ulcer of the cæcum invariably die, being already in a very low state and would not stand any operative procedure in most cases

Perforation of the intestine frequently occurs in cases of strangulated hernia This is particularly the case where part of the lumen only is involved, as in the Richter type of hernia The subject of hernia is dealt with later in this chapter

Diverticulitis of the colon affecting particularly the descending colon and the sigmoid areas of the large bowel may be associated with a perforation at some part, usually the sigmoid area These patients often give a history of suffering

disease In some of these patients the condition has already been diagnosed at a less acute stage using the barium enema technique, to show the diverticulæ present—the patient may even have the X-ray films with him when he comes for consultation In cases of amœbic dysentery there usually is extensive involvement of the large bowel, particularly affecting the descending colon and rectum *Perforation due to amœbic dysentery is not common, but it may occur in the* event of a granulomatous amœboma being formed Perforation of the large bowel at any point due to malignant disease is also not common in spite of the frequency with which malignant disease is found in that area *There appears to* be a defensive inflammatory mechanism proceeding at the same time as the *malignant growth*

Intestinal perforation by trauma caused by knife wounds and gunshot pellets is dealt with under Traumatic Surgery A limited number of intestinal perforations have been noted where the intestinal tract has been perforated by foreign bodies, such as a fish bone Straight pins, if swallowed, seldom do any serious damage, they are usually passed without difficulty The pin usually proceeds distally with the head foremost In rare instances pins swallowed by children have perforated the intestinal tract The pin may pass through the intestine and the minute perforation close, without apparent damage or leakage of intestinal contents On a few occasions patients, known to have swallowed a pin several months or a year before, have been found to have the pin under the skin of the abdominal

Typhoid perforations of the ileum usually occur late in the second week of the disease or in the third week, in most cases the diagnosis of the primary condition has been made and confirmed before the perforation takes place The perforation not infrequently occurs in hospital The interval of time between the onset of the illness and the time of the perforation gives a fair indication of the nature of the perforation If the interval is four to five days, it is usually an ascaris worm perforation, if the time is two to three weeks after the onset of the febrile illness, it is almost certainly a typhoid perforation Typhoid perforations occur early on rare occasions, but this is unusual Peptic perforations usually



FIG 26

Perforation of ileum due to ascar s worm

come on after some weeks of indigestion, but the patient almost invariably has a history of having had chronic dyspepsia of not less than a year Acute peptic ulcers seldom perforate

Perforation is associated with some degree of chronicity Apart from the history of the duration of the illness and the signs of peritonitis being present, the most valuable sign in diagnosing an intestinal perforation is the detection of free gas within the peritoneal cavity as seen on an X ray photograph taken with the patient in the sitting up position With any perforation there is inevitably a leak of gas into the peritoneal cavity A layer of gas between the diaphragm and the upper surface of the liver is seen (Fig 69) as a clear space in the X ray photograph This is the most certain method of diagnosing an intestinal perforation and should be undertaken in all suspect patients where an X ray apparatus is available Probably in a small proportion of cases a perforation due to an ascaris worm may be sealed off and the patient get better without operation Such cases are very liable to form extensive adhesions over a small localised area of the abdomen and later an intestinal obstruction may occur due to a constricting

the duodenum does occur it must be sutured very carefully immediately This form of operative perforation is a real danger If errors are recognised at the time they occur they can in most cases be rectified and no further trouble result, but if even a minor bowel injury of a perforating nature is sustained and not recognised, the result will be disastrous In undertaking a right-sided nephrectomy the second stage of the duodenum is also in danger

A very serious form of small gut perforation may occur if the back of the uterus is perforated during the performance of a dilatation and curettage of that structure This accident is seen most commonly in the case of criminal abortions undertaken by unqualified persons The patients are usually brought to hospital some days later with general peritonitis They almost invariably give a fictitious history of their illness Many of the deaths following criminal abortion are due to perforation of a piece of small gut and not necessarily due to infection introduced from below In a high proportion of these cases the patient dies and the true nature of the situation is recognised only at post mortem examination If a uterus is perforated by a dilator and the accident is recognised and no further operation proceeded with, the patient being returned to bed, it is rare for any further trouble to be noted The real danger is the failure to recognise the uterine perforation and causing a perforating wound to the gut with a curette

Where there is gangrene of the bowel present for any reason, as in the case of a strangulated Richter hernia, a local repair of the damaged area is never undertaken, it would be an unsound procedure to attempt such an operation The obvious and recognised standard treatment is to undertake a local resection and perform an end-to-end anastomosis The necrotic tissue in the immediate surroundings of a perforation cannot be sutured satisfactorily in most cases, due to the associated inflammation and induration It should be made a rule that if the patient's general condition is sufficiently good to warrant a local resection and primary anastomosis, this should be done in cases of gut perforation where feasible With a peptic perforation involving the stomach the results are much better if a partial gastrectomy can be performed soon after the perforation has occurred than if suture alone is undertaken It may be rather alarming to have to attempt a major operation in a patient whose condition is considered poor, but the results are very good

An interesting article has been contributed by Phou [11] and others, working in China, dealing with a hundred peptic perforations In sixty-seven instances a partial gastrectomy was undertaken, simple suture was undertaken in twenty-eight cases and conservative measures adopted in five instances It was found that the operative mortality was lower when a partial gastrectomy was undertaken (2 98 per cent) than when sutures alone were inserted (7 14 per cent)

The cases recommended for partial gastrectomy were those patients who perforated a pre-pyloric ulcer, where it was possible to perform a partial gastrectomy fairly easily By this means the perforated ulcer was removed completely and much of the acid-bearing area of the stomach taken away with subsequent advantage to the patient In some instances a second perforation had occurred following a previous perforation which had been sutured In these cases a partial gastrectomy was undertaken This operation was also undertaken when there was a history

wall, the overlying skin being intact It is presumed that these pins have passed through from the intestinal tract into the muscle of the abdominal wall and ultimately reached close to the surface where they could be felt quite easily The presence of a pin in the tissues can easily be confirmed by X-ray examination The pin was removed in each instance without difficulty

It is not always easy to detect a fish bone within the abdomen on X-ray examination, as it is not sufficiently dense to cast a good shadow in most cases Such cases should be X-rayed if possible, most of the fish bones which perforate the intestine are of fairly large size and may cast sufficient shadow to be detected In some of the cases noted fish bones were found to be perforating the wall of the rectum and ultimately passed out into the soft tissues appearing as a foreign body in an ischiorectal abscess, finally forming a fistula-in-ano The bone was removed from this position in two or three cases In some instances a perforation of the intestine occurs, not into the peritoneal cavity but into another loop of bowel and in this way an internal fistula is formed A fistula between the stomach and the transverse colon is not unduly rare A patient with gastro-colic fistula usually has low-grade diarrhœa and it is noted that in the material passed per rectum there is recently ingested food which is not digested Recognisable food such as pieces of tomato skin may be noted in motions passed fifteen minutes after the food has been eaten It may be desirable in some of these cases to operate on the patient, removing the communication between the two structures involved in the fistula and undertaking a local repair

Surgical traumatic perforations of the intestinal tract are far from negligible, they may seldom be admitted but undoubtedly occur If a sigmoid volvulus is seen on the first or second day after its occurrence, it is frequently possible to relieve it by the passage of a sigmoidoscope and a rubber tube into the dilated bowel loop After the immediate emergency is dealt with the patient may or may not be operated upon at a later date to prevent a recurrence if this is considered likely If a patient with a volvulus of the sigmoid colon has a sigmoidoscope passed on the third or fourth day after the onset of symptoms, it is much less likely to enter the obstructed loop and there is a considerable risk of damaging the bowel This was noted on one occasion when the manœuvre was being undertaken by a house surgeon under my instruction, this catastrophe was therefore my responsibility The rubber tube could be felt very easily through the anterior abdominal wall and it was obvious that a perforation had occurred The patient had already been prepared for operation, considering that the passage of the tube might not be possible An immediate operation was undertaken and it was found possible to repair the damaged large bowel and untwist the volvulus The patient made an uneventful recovery fortunately

In a case where a right hemicolectomy is being performed for a growth of the cæcum or ascending colon it is necessary to exercise particular care to avoid damage to the second stage of the duodenum This structure may not be expected in the field of operation The duodenum is supported by a mass of soft areolar tissue and looks a dull greyish colour Having no peritoneum on the surface at this area, it is very easy to mistake it and push it aside with less gentleness than it deserves, it may easily be injured unless handled with care If an injury of

the duodenum does occur it must be sutured very carefully immediately This form of operative perforation is a real danger If errors are recognised at the time they occur they can in most cases be rectified and no further trouble result, but if even a minor bowel injury of a perforating nature is sustained and not recognised, the result will be disastrous In undertaking a right-sided nephrectomy the second stage of the duodenum is also in danger

A very serious form of small gut perforation may occur if the back of the uterus is perforated during the performance of a dilatation and curettage of that structure This accident is seen most commonly in the case of criminal abortions undertaken by unqualified persons The patients are usually brought to hospital some days later with general peritonitis They almost invariably give a fictitious history of their illness Many of the deaths following criminal abortion are due to perforation of a piece of small gut and not necessarily due to infection introduced from below In a high proportion of these cases the patient dies and the true nature of the situation is recognised only at post-mortem examination If a uterus is perforated by a dilator and the accident is recognised and no further operation proceeded with, the patient being returned to bed, it is rare for any further trouble to be noted The real danger is the failure to recognise the uterine perforation and causing a perforating wound to the gut with a curette

Where there is gangrene of the bowel present for any reason, as in the case of a strangulated Richter hernia, a local repair of the damaged area is never undertaken, it would be an unsound procedure to attempt such an operation The obvious and recognised standard treatment is to undertake a local resection and perform an end-to-end anastomosis The necrotic tissue in the immediate surroundings of a perforation cannot be sutured satisfactorily in most cases, due to the associated inflammation and induration It should be made a rule that if the patient's general condition is sufficiently good to warrant a local resection and primary anastomosis, this should be done in cases of gut perforation where feasible With a peptic perforation involving the stomach the results are much better if a partial gastrectomy can be performed soon after the perforation has occurred than if suture alone is undertaken It may be rather alarming to have to attempt a major operation in a patient whose condition is considered poor, but the results are very good

An interesting article has been contributed by Phou[11] and others, working in China, dealing with a hundred peptic perforations In sixty-seven instances a partial gastrectomy was undertaken, simple suture was undertaken in twenty-eight cases and conservative measures adopted in five instances It was found that the operative mortality was lower when a partial gastrectomy was undertaken (2 98 per cent) than when sutures alone were inserted (7 14 per cent)

The cases recommended for partial gastrectomy were those patients who perforated a pre-pyloric ulcer, where it was possible to perform a partial gastrectomy fairly easily By this means the perforated ulcer was removed completely and much of the acid-bearing area of the stomach taken away with subsequent advantage to the patient In some instances a second perforation had occurred following a previous perforation which had been sutured In these cases a partial gastrectomy was undertaken This operation was also undertaken when there was a history

of bleeding from the ulcer in the past, in addition to the present perforation, or where multiple gastric ulcers were noted In those cases where a partial pyloric stenosis was noted the radical operation was also performed, and in some instances where perforation had occurred following medical treatment

Simple suture was reserved for young subjects where there was very little local induration, with a comparatively short history of peptic trouble In such cases simple suture and application of an omental pack was considered adequate In late cases where the patient's condition is considered very poor it may be possible only to over suture the perforation In patients over 60 years of age it was considered that a partial gastrectomy was an unduly severe operation and simple suture alone was used Simple suture alone may have to be used in some cases where the gastric ulcer, which has perforated, is in the upper third of the stomach, making partial gastrectomy impractical High gastric ulcers, however, are not common

In many cases of perforation of the small bowel by the ascaris worm it is desirable to perform a resection of the piece of small gut in which the perforation is situated rather than undertake a local repair of the perforation It may be necessary to remove a section 10 to 12 in and re-establish the gut by anastomosis Complete removal of an area of intestine may decrease the risk of later obstruction by band formation In many cases of ascaris perforation a primary resection with anastomosis is much more suitable than a local repair of the perforation Judgment must be exercised in each case in this matter

In the case of typhoid perforations there is extensive inflammation all over the abdomen due to the primary disease, and to undertake a primary resection may predispose to further adhesions In typhoid patients, who are already in very poor general condition in most cases, it is usually more practical to undertake a local repair oversuturing near-by structures to prevent further leakage The prognosis in cases of typhoid perforations is not good About 50 per cent of these typhoid cases die The use of intravenous fluids and antibiotics improves the prognosis greatly Blood transfusion is also very beneficial following operation for any form of perforation of the gut and should be undertaken in all cases as a routine procedure if blood can be procured for the patient

In some instances a patient may be admitted to hospital with a fully developed peritonitis and in such cases it is necessary to decide whether there has been a gut perforation of any sort or if the peritonitis is due to a blood stream infection Pneumococcal infection illustrates this possibility very well In such cases it is most helpful, especially where no X-ray apparatus is available, as in small country stations, to put the patient in the knee-elbow position and aspirate a small quantity of fluid from the peritoneal cavity via a small needle inserted close to the umbilicus This is not a dangerous procedure and it gives, in most instances, invaluable information If a gut perforation has occurred the aspirated fluid invariably contains a mixed suspension of organisms, whereas if the infection is via the blood stream a pure suspension of one germ only is obtained Only 1 drop of fluid is necessary for staining and microscopy If a " pure culture " is obtained, it is better to treat the case conservatively, using large doses of an appropriate antibiotic drug suitable for the treatment of the type of infection found If a

mixed culture of organisms is found, it can be estimated with certainty that a gut perforation has been the cause of the peritonitis and the case should be operated upon to deal with the perforation *Antibiotics will also be necessary* This is a most valuable procedure and should be used where doubt exists as to the origin of the peritonitis Pneumococcal peritonitis is the condition in which the greatest difficulty has been experienced It is usually not possible to detect any pulmonary lesion at the time the patients are admitted with the pneumococcal peritonitis A pure culture of gonococci has on occasions also been detected by this technique Such cases are again better not operated upon but treated conservatively This observation has been inserted at the end of this section as it is a suitable link between the subject of intestinal perforations and the closely allied subject of peritonitis

SURGICAL ASPECTS OF TYPHOID FEVER

In tropical countries where malaria is endemic, and typhoid fever is comparatively commonly seen, cases of the latter condition are almost invariably admitted to hospital initially diagnosed as malaria Headache, fever and general malaise are prominent symptoms At the early stage of the condition there is seldom evidence of localised abdominal disease These symptoms, so common *to many forms of fever, are in no way specific of typhoid infection A thick blood* film examination is almost invariably ordered in these cases, and antimalarial treatment prescribed pending the result of the blood film With the high incidence rate of patients with malaria parasites in the peripheral blood (10 to 20 per cent), *considerable ambiguity is initially caused by the fact that in a high proportion of* the cases the blood film is returned as positive for malaria The doctor attending the case is usually satisfied and considers that the patient's fever will probably settle down within the next forty-eight or seventy-two hours When on the third or the fourth day the patient's temperature is still high and the clinical condition is not improving, it becomes essential to reconsider the diagnosis This is the trouble with many conditions in tropical areas where malaria is present In a high proportion of cases, typhoid fever is suspected on the fourth day Most patients have been ill three days or more before coming to hospital A blood culture may thus be ordered on the eighth day of the clinical illness—that is the fourth day in hospital A blood culture at this stage is not very likely to be positive A positive typhoid blood culture is much more likely to be present if the blood is examined on admission to hospital *At this stage (the fourth day in hospital) a much more careful history is taken and a full physical examination* carried out, and a full blood count is then usually ordered In a patient with a dark complexion it does not appear possible to detect the "rose spots" of a typhoid-fever rash as seen in a light skin A high temperature and the relatively low pulse-rate relationship is usually fairly obvious by this time A positive blood culture is found in only about 20 per cent of the cases when taken at this stage

Watson and Laurie[15] observed that the rate of positive blood culture findings was much higher if a blood clot was used to make the blood culture rather than whole blood This is an important observation In getting blood clot for this

of bleeding from the ulcer in the past, in addition to the present perforation, or where multiple gastric ulcers were noted In those cases where a partial pyloric stenosis was noted the radical operation was also performed, and in some instances where perforation had occurred following medical treatment

Simple suture was reserved for young subjects where there was very little local induration, with a comparatively short history of peptic trouble In such cases simple suture and application of an omental pack was considered adequate In late cases where the patient's condition is considered very poor it may be possible only to over-suture the perforation In patients over 60 years of age it was *considered that a partial* gastrectomy was an *unduly* severe operation and simple suture alone was used Simple suture alone may have to be used in some cases where the gastric ulcer, which has perforated, is in the upper third of the stomach, making partial gastrectomy impractical High gastric ulcers, however, *are not common*

In many cases of perforation of the small bowel by the ascaris worm it is desirable to perform a resection of the piece of small gut in which the perforation is situated rather than undertake a local repair of the perforation It may be necessary to remove a section 10 to 12 in and re-establish the gut by anastomosis Complete removal of an area of intestine may decrease the risk of later obstruction by band formation In many cases of ascaris perforation a primary resection with anastomosis is much more suitable than a local repair of the perforation Judgment must be exercised in each case in this matter

In the case of typhoid perforations there is extensive inflammation all over the abdomen due to the primary disease, and to undertake a primary resection may predispose to further adhesions In typhoid patients, who are already in very poor general condition in most cases, it is usually more practical to undertake a local *repair oversuturing near-by structures to prevent further leakage* The prognosis in cases of typhoid perforations is not good About 50 per cent of these typhoid cases die The use of intravenous fluids and antibiotics improves the prognosis greatly Blood transfusion is also very beneficial following operation for any form of perforation of the gut and should be undertaken in all cases as a routine procedure if blood can be procured for the patient

In some instances a patient may be admitted to hospital with a fully developed peritonitis and in such cases it is necessary to decide whether there has been a gut perforation of any sort or if the peritonitis is due to a blood-stream infection Pneumococcal infection illustrates this possibility very well In such cases it is most helpful, especially where no X ray apparatus is available, as in small country stations, to put the patient in the knee elbow position and aspirate a small quantity of fluid from the peritoneal cavity via a small needle inserted close to the umbilicus This is *not a dangerous procedure and it gives, in most instances, invaluable* information If a gut perforation has occurred the aspirated fluid invariably contains a mixed suspension of organisms, whereas if the infection is via the blood stream a pure suspension of one germ only is obtained Only 1 drop of fluid is necessary for staining and microscopy If a "pure culture" is obtained, it is better to treat the case conservatively, using large doses of an appropriate antibiotic drug suitable for the treatment of the type of infection found If a

differential diagnosis in these cases at the early stage of the illness in each case, but it was not confirmed The true nature of the cases became obvious later when the undulant nature of the fever was easily seen from the temperature chart The blood was also tested for undulant fever and the diagnosis was confirmed by this means Cases of brucellosis of the liver have been reported with involvement of the gall-bladder similar to that seen in typhoid fever Psittacosis has been considered in some instances but this is a rare condition

In very acute typhoid cases, pneumonia may be suspected Typhus fever of the scrub type also bears some similarity to typhoid fever In a small outbreak of scrub typhus fever encountered in 1936, when eight cases were seen and treated in hospital, typhoid fever was considered initially in the first few cases In typhus fever there appears to be a marked tendency to hæmorrhages from the gums and mucous membranes, this is not usual in typhoid fever In the typhus cases seen, the patient's pulse appeared very weak indeed in all cases The patients did not appear to be so ill as most typhoid cases would appear to be, but undoubtedly the cases were very serious and several of these collapsed quite suddenly on the fifth, sixth or seventh day Three of the cases died out of eight seen

With paratyphoid fever A and paratyphoid B, the patients are usually ill for one or two weeks at home before coming to hospital Paratyphoid cases do not seem to run such a high temperature as do true typhoid cases A fair number of typhoid fever cases are admitted direct to surgical wards because of the abdominal symptoms complained of There is usually marked constipation and some abdominal pain Increasing headache occurs in a high proportion of cases there is almost invariably high fever It is necessary constantly to keep typhoid fever in mind as a possible diagnosis in any fever associated with headache and abdominal pain in tropical countries Many doctors who have not worked in remote stations will appreciate the difficulty there is in undertaking any laboratory work other than the simplest of procedures Limited staff, materials and apparatus practically preclude all forms of bacteriological procedures Blood, urine and stool examinations alone can be examined by the simplest of techniques To get over some of the difficulties of culturing organisms in suspected typhoid cases in Indonesia, Lie Kian-Joe [17] has experimented with sending specimens of typhoid and paratyphoid stools to laboratories in distant places by using sterile wet blotting-paper with an emulsion of typhoid fæces applied to it The paper can be dried and the specimen packed and sent by mail to a central laboratory for investigation Typhoid and dysentery organisms remain virulent and alive for several weeks when the dry-paper technique is used, and a much higher number of positive results can be obtained by this method than when specimens of solid stool are sent for examination The sending of infective material by air mail necessitates very careful packing Regard should be paid to postal regulations, as such a practice might be prohibited in some areas The method itself is simple and ingenious and very practical The bacilli appear to remain alive for several weeks on dry paper

Typhoid fever is a serious public health problem Once the condition becomes firmly established in a district it may be difficult to eradicate Sanghani,[18] working in the Bombay area of India, noted that there was a marked increase in

purpose it is necessary to exercise great care to avoid contamination, while the blood clot is being separated and transferred from a tube to the culture medium The method is worthy of consideration Mari's atropin test for typhoid fever has been largely discarded in recent years as being of very limited value, but considering that it is easy to perform, it may be considered of advantage in country stations where there are few or no bacteriological facilities In these circumstances simple clinical tests must be relied upon The relative slowing of the pulse in typhoid cases is a well-known physical sign A patient who is given $\frac{1}{33}$ gr of atropin sulphate normally gets an increase of pulse-rate of about twenty beats per minute, twenty minutes after the injection is given In a patient suffering from typhoid fever the pulse-rate rises very little after an injection of $\frac{1}{33}$ gr atropine sulphate The rise is less than ten beats per minute, five beats only per minute is usual The test can be considered positive if the pulse-rate is increased by not more than ten beats per minute It has been used in country stations in the past and found very helpful on several occasions A positive result can be classed as strongly suggestive of typhoid fever Lowe's midriatic atropin eye test is not easy to interpret and has not been found useful When a positive Mari's atropine test and a slow pulse-rate, relative to the temperature, are both found, it can be taken that the diagnosis of typhoid fever is well-nigh certain

Manson-Bahr [16] suggests that the performance of a diazo reaction is most useful in suspect typhoid cases (see Extract) It requires only four reagents apart from distilled water and can be carried out at the bedside in a few minutes This colour test, which is positive in typhoid fever, may also be positive in bacillary dysentery, pneumonia and pulmonary tuberculosis, but these can usually be excluded on clinical grounds Examination of stool specimens from typhoid patients does not usually become positive until about the middle of the second week The diagnosis should be confirmed by this means if laboratory facilities are available, but such facilities are usually limited to the larger stations A Widal reaction does not become positive until the third week, or sufficiently strongly positive to be diagnostic it is therefore not of use for diagnosis in the early stages of the disease but is helpful in confirming the diagnosis later

Only a very small proportion of patients in tropical countries have had T A B injections to immunise them against the typhoid group of fevers If offered such form of immunisation they almost invariably refuse, saying they are not sick They do not understand the rationale of immunisation in most cases other than in vaccination for smallpox The diagnosis of typhoid fever is made much more easily in the presence of an epidemic or where there is a high incidence of the condition and the illness is constantly being looked for Where the condition is sporadic and not frequently seen, it may be overlooked for several days

Brucellosis may resemble typhoid fever in some respects but, having observed very few cases of this condition personally, an opinion cannot be expressed which would be of value on this matter The few brucellosis cases seen personally were noted in the south of England in 1932 when a small outbreak of the condition occurred on the south coast, in Sussex The patients suffered from undulant fever, one of the varieties of brucellosis Typhoid fever was considered as a

limiting the amount of food taken, the patient is very liable to be deprived of fluids as well to some extent If patients are taking inadequate fluids by mouth, *it is advisable to supplement this by giving fluids per rectum* Most patients can retain fluids in this way if not given too quickly Intravenous fluids may be necessary in some cases during the very ill stage of the disease

Some consideration has already been given to perforation of the bowel in typhoid fever Tseng and Feng,[21] commenting on perforation of typhoid ulcers, give a good concise list of the signs of perforation of the gut A sudden increase in abdominal pain, which is usually severe, is noted There is some muscle guarding of the abdominal wall *Intestinal sounds which are not very marked* already due to the extensive inflammation present within the abdomen become even less Pneumoperitoneum is almost invariably present and should be looked for carefully It has already been noted that in confirming the presence of pneumoperitoneum by X-ray examination the X-ray photograph should be taken with the patient in the " sitting-up position " , the abdomen should be photographed to show the area of the diaphragm particularly (Fig 69) Gas present in the area between the upper level of the liver and below the diaphragm can be detected in about 65 per cent of the cases of perforation This is a most important form of examination Slight abdominal distension is often present Prior to the abdominal distension there is generally abdominal retraction with a rather scaphoid appearance of the abdomen There may be slight shifting dullness present in the abdomen Obliteration of liver dullness on percussion is found in these cases

Apart from finding a pneumoperitoneum present on examination, the other two signs which are most valuable are that a patient can be found to have mixed organisms within the peritoneal cavity, on aspiration of the peritoneal cavity with a serum needle and syringe The patient should be placed in the knee-elbow position The aspiration should be undertaken close to the position of the umbilicus The needle need only enter the peritoneal cavity for a very short distance One or two drops of peritoneal fluid only are necessary for this examination Microscopic examination of the fluid removed can be undertaken immediately *Masses of mixed organisms are found in the case of a perforation* of any sort and this is a practical test which gives a certain answer, and is most useful in stations where there is no X-ray with which to detect a pneumoperitoneum radiologically

If a perforation of the gut is suspected and a laparotomy decided upon, the abdomen should be opened carefully and rather slowly The object of going slow is that if a perforation has taken place it will be noted that on making a very small puncture of the peritoneal cavity a rush of gas will be emitted If no perforation had taken place there is a negative pressure in the peritoneal cavity and no gas comes out This sign should be looked for Considering the poor condition of most of these patients and the extent of the inflammation within the abdomen, the minimum of surgery should be undertaken consistent with closing the perforation and draining the abdominal cavity The perforation should be closed locally and omentum stitched over the area involved A drainage should be inserted into the pelvis through a separate opening in the lower abdomen and the primary

the incidence of typhoid fever between the years 1936 and 1948 The virulence appeared to increase annually With the use of chloromycetin from the year 1946 onwards the position improved greatly An extract showing the figures for the Bombay area during these years is given The details are of considerable importance and interest Subramaniam,[19] also working in India, records the incidence of typhoid fever in one area The mortality rate for this condition has been reduced to about one-tenth of the previous rate since the introduction of chloromycetin in treatment The complications requiring surgical treatment have also been correspondingly reduced Late cases of typhoid fever still come to hospital and in such cases complications may be expected Intestinal perforation is the most serious complication of typhoid fever Gut perforation occurs in about 2 to 5 per cent of the cases On occasions an acute typhoid perforation may occur quite suddenly, as the first indication of the illness, but this is exceptional One case of this nature was seen in a sailor who perforated a typhoid ulcer while on a marine launch in the near-by harbour The nature of the condition was confirmed at operation and subsequently serologically The patient was operated upon immediately and recovered

Intestinal hæmorrhage occurs in a high proportion (15 to 20 per cent) of cases Repeated hæmorrhages of variable sizes may occur The initial hæmorrhages are usually not very severe, but act as a warning of what may come later Much larger bleedings usually follow the initial hæmorrhage, and one of these may be fatal In view of the high proportion of cases which suffer from hæmorrhages, all cases of typhoid fever should be blood-grouped at an early stage of the disease and a blood donor found to give blood should this become necessary It is very unwise to wait until the serious emergency has occurred A sudden internal hæmorrhage is usually associated with a sudden marked drop in the temperature (4° to 5°), sweating and feeble pulse There is usually marked pallor The low ill state of a patient with typhoid fever predisposes to inadequate fluids being taken The patient is unable to clean his mouth properly, and this gives rise to marked sores about the lips and gums There may be much furring of the tongue

Parotitis, with abscess formation, occurs in some instances If a parotid abscess is incised a salivary fistula may occur This is quite a serious sequel, as it is then very difficult to get the fistula to close after the patient has recovered from the initial illness If a parotid abscess forms and a localised collection of pus is detected, it is advisable to aspirate it rather than open it with an incision To aspirate a parotid abscess with a medium large bore needle, size 14 S W G may be sufficient in many cases to remove the pus to a sufficient extent to allow the condition to settle down without open operation by scalpel Aspiration through healthy skin at some distance from the site of the abscess or via the mouth is not likely to predispose to fistula formation This procedure is advisable rather than incision Periostitis, sinusitis and conjunctivitis are reported by Cecil and Loeb [20] as complications of typhoid fever, but none of these have been encountered personally Thrombosis in leg veins is not uncommon This may be predisposed to by the presence of the infection and an inadequate amount of fluid taken during the illness, as well as the sedentary state of the patient In

symptoms of perforation are placed very high up in the abdomen, it might be wise to compromise, making a right paramedian incision so that either condition could be dealt with, depending on the findings at laparotomy The presence of bile staining in the fluid in the peritoneal cavity, as seen on opening the abdomen, suggests the possibility of the gall-bladder being perforated Cholecystitis and gall-stones appear to be less common in tropical countries than in temperate zones Typhoid fever is undoubtedly an ætiological factor in the production of gall-stones in some cases Das[23] comments on the frequency with which gall-bladder disease is seen in the Bengal area of India as opposed to other areas, typhoid fever may be a contributory factor

Gall stones may be due, in the tropics, to biliary ascariasis as well as typhoid fever, as described by Wang *et al*[21] Ascaris ova are found on microscopic section of gall-stones in some instances Biliary ascariasis is comparatively common in some areas of China Wang and his colleagues operated on 141 cases of biliary ascariasis in six years Typhoid fever probably accounts for only a very small proportion of the cases of gall-stones in temperate climates where typhoid fever is less common

PERITONITIS FROM VARIOUS CAUSES

Peritonitis or inflammation within the peritoneal cavity is seldom seen as a primary condition This condition may be secondary to a very large number of maladies Many of the signs and symptoms often ascribed to peritonitis are more truly the result of the condition giving rise to the peritonitis than the peritonitis itself Under these circumstances a very large number of signs and symptoms are attributed to peritonitis, whereas there are only three main signs which can be directly considered due to the condition These signs are

1 A progressively rising pulse-rate
2 Muscle guarding
3 Abdominal distension

One very unfortunate but highly instructive case was observed several years ago where the signs present were due almost exclusively to primary peritonitis A female patient aged about 26 years was admitted to hospital for the repair of an enormous rectovaginal fistula It was considered desirable in this case to undertake a preliminary colostomy on the transverse colon, prior to the repair operation on the fistula of the rectum As some trouble had been experienced with previous colostomies, it was decided to divide the transverse colon at the time of the initial operation and bring out each end through a separate opening in the abdominal wall By this means the lower segment could be completely isolated from the proximal segment and the lower part cleaned more adequately The operation was undertaken without any apparent difficulty The patient was returned to bed in what appeared to be a very good general condition Eight hours after operation the patient's pulse was noted to be very fast, the rate being 130 beats per minute In spite of the fast pulse-rate the patient did not look distressed, her colour was very good, there was no pallor of the conjunctiva, the

d closed An intestinal resection for removal of the perforation is not d in these cases Infected material should be removed by suction apparatus ılable, as this causes less handling of the bowel than using swabs In rphoid cases an ulcer seldom perforates The infection appears to be of a low grade virulence

Typhoid fever being due to a bacterial infection with early septicæmia variable complications may occur Many rare complications are of tical interest only One of the complications not very frequently seen is ion of the gall bladder One female patient only 12 years old, who was a tent typhoid carrier, was found to have many gall stones present in the ladder in spite of her early age The gall bladder was removed The ı are illustrated in Fig 27 It was considered that the typhoid fever was



FIG 27
Gall stones removed from chronic typho d carr er aged 12 years

ɔrecipitating cause of the gall stones The carrier state occurs in about cent of typhoid cases There may also be a typhoid pyelonephritis and ne cases it is possible to isolate typhoid bacilli from the urine

ıu and Chu [2] working in China, report eight cases of perforation of the ladder in children associated with typhoid fever The incidence of this lication was 3 9 per cent in their series of cases that is, roughly one in y five—a very high incidence Five out of eight of the patients died from ery serious condition that is, a 63 per cent mortality of those who developed omplication If symptoms occur in a patient suffering from typhoid fever stive of a perforation of some sort, the possibility of perforation of the ladder should also be considered as well as the better known intestinal ration In a small number of cases presumed to have a perforation of the l no perforation was found, but the possibility that such cases were due small perforation of the gall bladder, which was missed suggests itself ration of the gall bladder should be kept in mind when confronted with ıd cases developing sudden acute upper abdominal pain It would be difficult to detect a perforation of the gall bladder through the usual lower minal incision which is used in most cases of gut perforation If the

points will be discussed relative to the peritonitis produced rather than the condition giving rise to the peritonitis All forms of intestinal perforation give rise to peritonitis to some extent Trauma may be a cause of gut perforation as seen in gunshot wounds and stab wounds of the abdomen Perforation of the uterus by a cervical dilator and the use of a uterine curette which enters the abdominal cavity in error is a serious gynæcological accident Continued curetting in the wrong anatomical area, in an endeavour to remove uterine contents under the impression that the curette is in the uterine cavity, damages a loop of small gut lodged in the pelvis at the back of the uterus Many such cases are associated with criminal abortion undertaken by unqualified persons The patients are sent to hospital at a stage when peritonitis is well developed The history of the illness is almost invariably concealed and the death rate is excessively high Cases have been seen in consultation where recognisable pieces of small gut have been curetted out into the vagina If the condition is suspected as a cause of the peritonitis present, it is well worth examining the patient very carefully to see if any tissue can be found resembling fragments of bowel mucous membrane Such an examination is seldom undertaken as the true nature of the condition is not usually suspected

Peritonitis may be due to gut perforations from ascariasis or typhoid fever It also constantly occurs as a result of perforation of peptic ulcers of the stomach or duodenum In some instances it is secondary to perforation of the large bowel where malignant disease, amœboma or diverticulitis is present occasionally it may also occur secondary to a schistosome mass

Hydatid cysts in abdominal organs, notably the liver, may rupture into the peritoneal cavity These give rise to shock rather than true peritonitis Secondary cysts may occur in the lower abdomen if the patient survives rupture of the primary cyst The serous covering of the bowel may become inflamed in the various forms of bacillary dysentery but gut perforation is very rarely associated with the bacillary dysenteries Typhoid fever is not usually classed with the bacillary dysenteries though it is closely allied to them It has special characters of its own Peritonitis secondary to typhoid perforation is a comparatively common complication, occurring in about 2 per cent of typhoid cases

Peritonitis occurs secondary to inflammatory conditions of the vermiform appendix quite frequently The condition also occurs secondary to strangulated hernia of the external or internal types Band obstructions of the gut are also associated with local peritonitis frequently There is a marked rise of the pulse-rate in any condition where the peritoneum becomes inflamed either locally or generally

Peritonitis is invariably followed by peritoneal adhesions and is therefore a very serious thing Adhesions are liable to be followed by later complications they may give rise to band obstructions, they may also involve the pelvic peritoneum and be a cause of sterility in female patients by reason of closure of the fimbriated ends of the Fallopian tubes Tuberculous peritonitis appears to be comparatively rare in most tropical countries in spite of the frequency with which pulmonary tuberculosis is encountered

volume of the pulse was excellent and there was no restlessness or sweating or other signs suggestive of internal hæmorrhage The patient said she was comfortable *The maximum rise of pulse rate following any operation is usually* at about eight hours after the operation is completed The pulse rate then falls after this time to close to the normal level The patient's temperature was not unduly high, being 99 4° F There was some muscle guarding present in the abdominal wall The patient did not appear to be unduly uncomfortable This unusual state of affairs was perplexing As the patient's pulse volume was good, her blood pressure well maintained and her conjunctival colour satisfactory it was decided not to consider any further operation, there being no sure evidence of internal hæmorrhage By the next morning the patient's pulse had gone up to 148 beats per minute and it was quite apparent that there was something radically wrong The patient still looked remarkably well considering the high pulse-rate The blood-pressure was still adequate and close to normal and the patient's pulse volume was very good although the rate was very fast There was still some muscle guarding and slight abdominal distension Morphia and digitalis were given to the patient, following which she slept soundly and apparently very peacefully She wakened up six hours later and her pulse was still rising, she asked for some food At thirty hours after the operation the patient's pulse rose to 164 beats per minute Soon after this she collapsed and died In view of the unusual nature of the case a post mortem examination was undertaken There was a most gross and virulent peritonitis present which accounted for the rising pulse, the muscle guarding and slight abdominal distension Obviously some contamination had occurred at the time of section of the gut, though this was not noted at the operation There was no evidence of any internal hæmorrhage at all This case illustrates, probably better than any other ever seen personally, the signs of a " pure peritonitis "

The outstanding sign of peritonitis is without doubt *a progressively rising pulse rate*, in the absence of evidence of internal hæmorrhage If a rising pulse is due to an internal hæmorrhage, the character of the pulse is usually poor, the volume being small The patient develops a sense of thirst and is restless The blood pressure also falls progressively In the case spoken of, the remarkable aspect was the surprisingly satisfactory appearance of the patient, in spite of the rising pulse-rate The patient's temperature did not rise above 99 8° F A patient may have marked peritonitis without an unduly high temperature A high temperature is usually suggestive of pus under tension, where there is marked toxic absorption The amount of pus giving rise to an elevated temperature may be quite small, but the tension is essentially high A patient with quite a small amount of pus under tension, due to a whitlow, may have quite a high temperature, whereas another patient with a large sloughing ulcer may have much pus present but under no tension and so the temperature remains normal It is most important to pay attention to the pulse-rate in any patient where the peritoneal cavity may be in any way implicated

There is a very large number of conditions which may give rise to a secondary peritonitis Many such conditions are being dealt with under the individual sub headings of this chapter, they will therefore only be mentioned here Some

peritoneum but there is not much pus formation These cases settle down quite quickly, taking about two weeks only in most cases The exact state of the tubes and pelvic peritoneum can be seen in the cases where the abdomen has been opened, in the belief that the condition is one of appendicitis requiring operation and salpingitis is found to be present at operation

In cases where a chronic tubo ovarian abscess develops there may be much pus present In removing the mass associated with this condition purulent material may enter the peritoneal cavity The pus in this condition is in almost all cases sterile The escape of pus locally may appear alarming, but it seldom seems to do any harm it does not cause an active peritonitis The removal of a tubo ovarian abscess is almost invariably devoid of complications The cases do remarkably well and are much improved by operation It is advisable when operating in these cases to have a suction apparatus available to deal with any escape of pus

In cases where it is necessary to undertake transplantation of the ureters into the sigmoid colon because of a very large size vesico vaginal fistula being present, there may be some soiling of the pelvic peritoneum by urine after section of the ureters, every effort should be made to avoid this by placing swabs appropriately, but in the few cases where some soiling of the pelvis with a little urine has occurred no peritonitis has been noted

Pelvic peritonitis may be produced in some tropical areas by the practice of using native enemata in the treatment of abdominal complaints These enemata are made from decoctions of irritant herbs A condition of low grade peritonitis is produced due to the irritant nature of the contents of the medication The condition produces marked lower abdominal pain There is much abdominal distension There may be sloughing of some of the mucous membrane of the rectum but there is no intra abdominal pus formation and the inflammation settles down slowly without operation The condition is treated as a paralytic ileus, as it has many features similar in nature In any abdominal complaint, the nature of which is not clear, the patient should be interrogated to find out if a native enema has been given at home before coming to hospital Pelvic peritonitis due to native enema is quite a common condition in many parts of Africa In some districts it may not be seen at all, but this is exceptional These cases are better not operated upon, they settle down with strong sedatives alone Antibiotics are helpful in settling down the proctitis produced Intravenous fluids are also an advantage in helping to decrease the distension

Pelvic peritonitis may also occur in female patients following the use of irritant vaginal tampons which are usually used in the belief that they increase fertility Ulceration of the upper third of the vagina is not infrequently caused and there is often marked pelvic peritonitis also in these cases, hence its mention in this section on peritonitis The possibility of either of these two sources of peritonitis should not be overlooked in patients where these forms of local treatment are used To forget the possibility of either of the conditions as a source of peritonitis may give rise to unnecessary operations suspecting other conditions being the cause of the peritonitis

The peritoneal cavity appears to have considerable ability to localise sepsis and overcome infection if the degree of contamination is not too massive and sudden Minute perforations of peptic ulcers as well as perforations due to ascaris worms *may frequently give rise to only mild symptoms and the condition* is often overlooked for two, three or four days In such cases the perforation is of minute size and the peritonitis very slight, there being a minimal local leak of intestinal contents Many such cases probably get well without treatment Localised adhesions, however, are likely to form and these may give rise to a band *obstruction later*

The object of operating on a case of peritonitis is to remove the major amount of infected material from the peritoneal cavity, allow for drainage and close the perforation through which the escape of infected material occurred In the case of minute perforations, with little or no peritonitis, the patient is in some cases better treated conservatively, using rest, sedatives and antibiotics, etc In the case where there is active underlying disease such as in appendicitis, appendicectomy should be undertaken to eradicate the disease completely in the early stages, before complications spread There is no advantage in taking a patient to the theatre whose pulse can scarcely be felt, for if operated upon he would certainly die soon after operation It is better in these cases to risk treating the patient conservatively, in a small number of such cases the patient recovers Penicillin in addition to streptomycin is very helpful in extreme cases If a patient's condition is reasonably good, all cases of peritonitis due to large perforations of the intestine should be operated upon as early as possible

Peritonitis may occur following certain operations In cases of carcinoma of the cervix of the uterus there may be a fungating mass present in the diseased site To avoid disseminating this tissue at the time of the total hysterectomy anticipated, it is very helpful to curette away the fungating mass initially from below and pack the vagina for forty eight hours to control the bleeding By this means the field of operation is made much cleaner and easier to deal with The risk of producing a pelvic peritonitis is thus much reduced The hysterectomy is undertaken one week after the curettage of the cervix This procedure is necessary only in a limited number of advanced cases Every effort must be made to decrease the risk of depositing malignant tissue in the pelvis when removing the malignant structure

Local peritonitis develops in the case of strangulated herniæ, and it is necessary to exercise great care in preventing infected fluid from a hernial sac re-entering the abdominal cavity on releasing the neck of the hernial sac Postural reduction of strangulation should not be undertaken if the condition is known to have existed more than twelve hours because of the risk of gangrene and peritonitis developing All herniæ of the Richter type should be operated upon at once, this type of hernia is very liable to early gangrene and peritonitis and is unsuitable for postural reduction This subject is dealt with later on in this chapter

Pelvic peritonitis secondary to gonorrhœal infection in the Fallopian tubes should not be operated upon The condition is very responsive to treatment by penicillin In these cases there is usually extensive inflammation of the pelvic

diagnosis absolutely certain without submitting the patient to an undesirable operation Mixed organisms recovered from the peritoneal tapping indicate an intestinal perforation of some sort as being the cause of the *peritonitis* *If a* tapping is undertaken in a patient suffering from a sickle cell crisis the fluid will contain no organisms but it may be noted to be of a very highly yellow colour like jaundiced urine, the high colour is associated with the hæmolytic process which is occurring in the patient The yellow colour can be seen more easily if 1 drop of the fluid is put on a white swab One drop should be examined under the microscope in addition, to see if any organisms are present The specimen will be found to contain no organisms in these cases

Mention has already been made of the high death-rate from peritonitis in children who perforate the gall-bladder in typhoid fever cases Although this form of peritonitis has not been recognised personally, Liu and Chu [22] report many cases seen in China, where this very serious condition appears to be well known The peritonitis in these cases is associated with bile-staining of the peritoneal exudate due to the bile present

In cases of appendicitis in the tropics the rule should be adhered to that immediate operation should be undertaken only in cases which have been present for less than forty hours If this time period is exceeded it is better to treat the patients conservatively in most cases It should be remembered that the patients very frequently say the condition started "yesterday" but in most cases the duration of an illness can usually be doubled with fair accuracy The "yesterday" often refers to the time when the condition became much worse

Patients in the tropics do not appear to stand general peritonitis well It is probably better in all cases where an inflammatory mass is felt to treat patients conservatively Operation can be undertaken after an interval This procedure is much safer Falconer,[25] commenting on the seriousness of peritonitis in African patients, suggests that if peritonitis is confirmed the prognosis is bad and conservative measures should be considered where possible This is rather an extreme view but it is certainly necessary to exercise caution in all cases of peritonitis as the outlook is very serious In patients who eat a diet of large bulk and low calorie value there is a much greater desire for food than in those who eat a small bulk of high calorie value Many patients in the former group with appendicitis, even though they have peritonitis present, still may frequently ask for food, it is necessary to restrain them from taking food It is often noted that in cases of appendicitis in the tropics the extent of the pathology present far exceeds the expectations of the doctor undertaking the operation, considering the symptoms complained of and the physical signs detected on examination Many cases with marked peritonitis complain of very little pain Streptomycin has been found to be a most useful antibiotic drug in the cases of peritonitis associated with appendicitis In a high proportion of the cases the infection is associated with the presence of a Gram-negative bacillus Twenty-five years ago paralytic ileus was one of the serious complications frequently associated with appendicitis in non tropical areas, but it is now seldom seen

In the tropics many patients tend to come to hospital at a late stage of disease with complications already developed before arrival at hospital Paralytic ileus

Rupture of a liver abscess into the peritoneal cavity is an extremely serious ndition A high proportion of such cases die in a state of acute shock If a itient survives the immediate shock of the rupture of a liver abscess into the ·ritoneal cavity he then has to cope with a general peritonitis as the liver material infective Few patients survive this catastrophe, being already in a very weak id debilitated state Most liver abscesses are secondary to amœbic hepatitis ith abscess formation, though not all

In the case of a female patient suffering from a ruptured ectopic pregnancy iere is almost invariably some abdominal distension Blood in the peritoneal avity causes the inhibition it seems There is no infection present The fast ulse of a ruptured ectopic pregnancy case is associated with all the signs of an iternal hæmorrhage If a young woman is admitted to hospital with the history f having missed one menstrual period and is suffering from a fast pulse, a low lood pressure, pallor of the conjunctiva, and some distension of the abdomen, he is invariably found to be suffering from a ruptured ectopic pregnancy The ondition should not be mistaken for peritonitis

Sickle cell disease must be kept in mind in the cases of young people admitted o hospital if they are of African origin The condition may give rise to signs and ymptoms very suggestive of a peptic perforation with peritonitis, there being a ›oard like rigidity of the abdominal wall in some cases The severe headache omplained of and marked sweating usually present is helpful in spotting the ond tion The patient almost invariably gives the history of a similar previous ıttack though it is usually said to have been less severe than the present one It s very usual to have the information volunteered that the attack went off by tself after about four days If the condition was a perforation of any sort it would be most unlikely to have improved without treatment The history of a previous attack and joint pains and fever during childhood is very characteristic of a sickle cell crisis

Pneumococcal peritonitis is a condition which gives rise to a lot of errors Almost all the cases seen have been in adult female patients and not in children as suggested in the textbooks In this condition all the signs of peritonitis are present There is a fast pulse rate, muscular guarding and some abdominal distension The patient usually has a high temperature in addition A characteristic which is particularly noted in pneumococcal peritonitis, as opposed to other forms of peritonitis, is the marked vomiting which is present in almost all cases There may be no evidence of a chest lesion at this stage If the cause of peritonitis is not obvious and there is marked vomiting, pneumococcal peritonitis should be suspected It is considered unwise to operate on pneumococcal peritonitis , it *is much better to rely on massive doses of antibiotic drugs and give sulpha drugs* by injection in addition In a case where pneumococcal peritonitis is suspected, it is of particular value to tap the abdominal cavity close to the umbilicus with the patient in the knee elbow position A small quantity of fluid can usually be withdrawn without difficulty 1 drop is all that is necessary A microscopic preparation should be made and stained immediately to see the nature of the causative organism or organisms present In the case of a pneumococcal peritonitis it will be found that a pure culture of pneumococci is present This makes the

NATIVE ENEMATA · ITS DANGERS AND TREATMENT

The use of enemata in the treatment of some abdominal complaints appears to be a universal practice The methods of application and the substances used vary from time to time, and from one location to another Enemata were used more frequently in the past in Europe than at present With the increased knowledge of pathology, and the greater range of effective drugs available for treatment, the use of medicinal enemata has declined Soap and water enemata are most commonly used in all parts of the world In the practice of unqualified persons in tropical areas the use of irritant herbs in the preparation of enemata is a common procedure Ginger and pepper, both locally grown, make up the essential ingredients in many cases The addition of irritant roots and bark is also in common use In temperate climates there have been many substances added to the soap solution usually employed for enemata Animal bile was popular at one time, it was considered beneficial The addition of a dram of turpentine was also used Doolan,[2] referring to old records of the practice of medicine in Ireland, mentions the use of tobacco in enemata Tobacco smoke was blown into the large bowel The somewhat irritant action was considered beneficial Colles, in 1748, advocated the use of tobacco infusion as an enema for the arrest of hæmorrhage which was difficult to control It caused fainting, depression and cold perspiration, in fact every indication of shock and a low blood-pressure Brodie, in 1811, found that 4 oz of an infusion of tobacco given as an enema killed a dog and 1 oz killed a cat The publication of these experiments brought the use of tobacco enemata to an abrupt halt in England Such records are interesting relics of the past century and somewhat reminiscent of the practices still carried on in less developed areas of the world Tobacco is still used as a constituent of enemata on some occasions in tropical areas in the country villages and is a highly dangerous substance to use in this way Tobacco when added to enemata causes marked collapse of the patient, and death in some instances

Patients in all parts of the world resort to household remedies before seeking professional advice for minor complaints Such a practice is quite reasonable and correct Only if these measures fail and the condition is obviously not improved by them is skilled advice sought The subject of native enemata is considered sufficiently important to warrant some comments on the practice, as there are many serious complications caused by it as well as some deaths following the employment of this method of treatment The complications resulting from the use of enemata as given in village life in the tropics are commonly seen but frequently not recognised by those with limited experience following recent arrival in tropical areas Practically no reference is made to the subject in surgical textbooks or medical journals The enemata employed which give rise to complications almost invariably contain a suspicion of ginger and pepper as essential ingredients The effects of certain roots and barks which are sometimes added are noted in the form of urticaria and dermatitis Ginger and pepper are highly irritant substances When they are introduced into the rectum and large intestine they cause marked abdominal pain Although the enema is painful the number

is therefore not uncommonly seen in cases of peritonitis This condition is associated with the release of an enzyme, cholinesterase, in the gut This substance has an action not unlike curare in that it inhibits bowel action by a block at the nerve muscle junction Physostigmin counteracts the action of cholinesterase but the action is reversible, and when the physostigmin wears off the paralytic condition recurs On the other hand, cholinesterase can be "fixed" by di-isopropyl fluorophosphonate, which is marketed under the trade name of "D F P" by *Boots Chemists of Nottingham, England* This fixing action—and so removal of this toxic substance—is of enormous value as the action between cholinesterase and D F P is not reversible This drug should be available in all surgical departments for such urgent cases of paralytic ileus secondary to peritonitis Two cubic centimetres of a 0 1 per cent solution is injected intramuscularly, and within a matter of a few minutes peristaltic movements start and bowel sounds are re-established The bowels usually act within two hours with great relief to the patient and subsidence of the abdominal distension Walsh,[26] commenting on this subject, stresses the necessity of using *morphia freely in the relief of pain, he considers that pain is a definite factor* in causing the inhibition of the bowel, in paralytic ileus An improved electrolytic fluid balance also helps greatly and, therefore, intravenous saline glucose is a great advantage in cases which have vomited freely with paralytic ileus secondary to peritonitis

The use of an injection of 100 to 200 mg of hydrocortisone given by injection is of great benefit to patients with peritonitis It can be added to the intravenous fluids with conspicuous advantage It is a very stimulant drug It also tends to decrease inflammatory exudates and is of great benefit in cases of peritonitis

In any patient with peritonitis it should not be forgotten that a blood *transfusion is a great advantage This adjuvant to treatment was constantly* used before the introduction of antibiotic drugs and markedly reduced the mortality rate Many of the drugs suggested may not be available in small country stations but a blood transfusion can always be managed even with very limited equipment

Certain rare tropical conditions occasionally are encountered, giving rise to marked abdominal distension On one occasion a request was received from a junior colleague for a further opinion in a maternity case thought to have an intestinal obstruction due to paralytic ileus The case was one of rabies The woman had a distended abdomen of short duration On seeing the patient, the wild look in the woman's face and her jerky movements suggested the condition immediately On giving the woman some water to drink she went into violent spasms about the throat and the diagnosis was obvious On asking her if she had ever been bitten by a dog she immediately pointed to her right leg close to the knee where there was the healed scar of a dog-bite She had been bitten four months earlier by a rabid dog The doctor who referred the case had not previously seen a case of rabies Once rabies has been seen it cannot ever be forgotten This incident illustrates one of the vast number of rare possibilities which may be encountered in tropical surgical practice The case was of interest The patient died the next day due to rabies

examination the extensive granulating area, still present in the rectum, was unhealed and there was already early stricture formation This patient developed a subacute stricture of the rectum during the next month and intestinal obstruction was imminent It was decided that removal of the damaged area of the rectum was essential To remove a stricture of the rectum at this site is quite a difficult operation The site corresponds to the lower end of the peritoneal cavity where the peritoneum is reflected off the anterior surface of the rectum in its middle third Patients in tropical countries are seldom willing to accept a permanent colostomy performed for any reason They insist that it be closed before they can leave hospital If any condition is encountered in the left side of the colon, which cannot be removed complete and the continuity of the bowel re-established, it is advisable to perform an anastomosis between the transverse colon and the sigmoid loop of gut In the case in question the obstruction was developing below the sigmoid colon and a resection of the strictured area with a "pull-through" reconstruction was considered most suitable In any case in the tropics where the cause of a pelvic peritonitis is not obvious, enquiries should be made as to whether the patient has had an enema at home or not This form of treatment accounts for a fair proportion of cases of pelvic peritonitis

A limited number of cases have been encountered where tobacco has been added to the enema suspension in addition to the standard ingredients of ginger and pepper The notable feature about an enema given where tobacco has been added is the marked collapse induced by this substance, the use of tobacco leaf added to an enema is highly dangerous One unfortunate case was noted where a young pregnant woman was given an enema containing tobacco with a view to terminating a pregnancy The patient collapsed and died, the administrator of the enema committed suicide

Native enema proctitis bears a close similarity to a condition termed "chiufa" seen in Northern Rhodesia The term is applied to a condition of "gangrenous rectitis" of subacute onset, there are generalised pains present, the temperature is raised to about 104° F, there may be rectal prolapse, marked tenesmus and rectal distress This may be followed by constipation Later, the inflammation spreads to the colon and there may be late diarrhœa The cause of the condition is not stated but it bears a very marked resemblance to the picture produced elsewhere in Africa following the administration of a native enema

Whereas the practice of using highly irritant and inadequately measured substances in enemata cannot be looked on with favour, a very interesting observation has been made on this matter by a qualified registered nurse living in an African village This nurse was wakened with other members of her family by her niece, who was a girl of about 12 years of age who appeared to be having a nightmare The girl was talking wildly and struggling though still asleep She had been quite well during the day and went to bed following a large meal An attempt to waken the patient was unsuccessful The patient then appeared to collapse and go quite stiff, her pulse became almost imperceptible and her eyes opened and rolled about in an uncontrolled manner It was thought that she was dying All members of the household got up in great distress and arrangements were being made to get transport to take the patient to hospital

of serious complications is comparatively small considering the frequency with which the practice is undertaken In a limited number of cases there may be gross irritation of the rectum and sigmoid colon Marked proctitis and sloughing of the mucous membrane of the rectum sometimes occurs Extensive pelvic peritonitis is moderately common, with an associated high temperature It may be very difficult to decide how much of the symptoms complained of are due to the enema and how much is due to the condition for which the enema was presumably given

Following the extensive sloughing of the mucous membrane of the rectum, which occurs in severe cases, there may be a large mass of necrotic tissue protruding through the anal orifice This slough remains attached high up in the rectum for four to six days The position of attachment is commonly found to be about 3½ in from the anus, the position to which the tip of the finger reaches during rectal examination The prolapsed mass may initially simulate a prolapsed and gangrenous intussusception Close examination shows that it is not an intussusceptum The sloughing mass has a characteristic dark brown or almost black colour In any case where this dark slough is noted it will be found almost invariably that an enema has been given at home some days before coming to hospital The abdominal distension due to paralytic ileus seen in these cases settles down slowly Strong sedatives are required to relieve the pain There is little apparent improvement for about four days and after this time much flatus is passed and the condition improves progressively during the following three or four days It is advisable not to operate on these cases, they settle down, using conservative measures No pus is formed—there is extensive redness of the peritoneum as seen in a few cases opened in error as a junior medical officer Intravenous saline helps greatly to reduce the distension Starch and opium given per rectum also is beneficial With the separation of a slough there may be secondary hæmorrhage of a minor or a major order If the rectum is examined with a proctoscope following the separation of the slough it will be seen that there is an extensive granulating mass present over a wide area In some cases the complete rectum is encircled by the granulation tissue having lost its mucous membrane The appearance of the surface resembles that seen in the case of the condition of granular ophthalmia or trachoma in the upper eyelid There are multiple minute blebs of jelly-like granulations seen on the rectal wall There may be spreading sepsis from this raw area and for this reason it is advisable to use streptomycin in these cases to control this obvious source of infection by Gram-negative organisms As the condition heals there is a subacute stricture formation produced, which may be very marked Benign stricture of the rectum secondary to this form of ulcerative proctitis is a condition seldom mentioned under rectal pathology, but it is occasionally seen in some tropical areas

One male patient aged 16 years was admitted to hospital suffering from a slough of the rectal mucous membrane, secondary to necrosis, due to an enema administered at home The slough separated after six days, the peritonitis and abdominal distension settled down during the first ten days in hospital The patient was about to leave hospital after three weeks, but it was noted that he was having great difficulty in getting his bowels to act On proctoscopic

dilatation of the right ventricle of the heart is invariably noted Some petechial pancreatic hæmorrhages may also be seen The exact cause of the condition has never been ascertained with certainty

The incident recorded from Africa may be of interest to those in the Far East and those in Africa may not have been aware of the condition so well known in parts of Asia Whether the strong enema was beneficial in the case described from Africa is uncertain, but it appeared to be the factor which was helpful Stimulation of the rectal area by the stretching of the anal sphincter has been advocated as an emergency measure in anæsthetic collapses, whether it is of value or not it is difficult to say The fact that the incident related was observed by a qualified nurse makes the record of more value as it is likely to be more accurate than if related by an unqualified person

A case has been seen where an injury of the rectum occurred as a result of the administration of a native enema given in an African village A hollowed-out narrow-necked gourd is usually used for the purpose of giving an enema in villages in remote parts In the larger towns rubber syringes are used though the contents of the enema may still be of the very irritant nature mentioned If the rectum is injured fulminating peritonitis and death follow, probably in all cases

Fig 28 is an interesting photograph of a monument erected to a patient who died as a result of a native enema On the base of the monument is a drawing depicting the enema being given

DETERMINATION OF PALPABLE BOWEL MASS

In the first section of this chapter consideration was given to the broad outline of pathology affecting abdominal organs In considering the possible nature of any palpable bowel mass a major assumption is taken for granted, that the palpable abnormality is directly related to the intestinal tract It is not always easy to be certain that a mass felt within the abdominal cavity is in fact directly related to the intestinal tract It may be very helpful on occasions, where some doubt exists as to the presence of a tumour being present, to examine a patient on two occasions, an aperient being given between the two examinations What feels like a possible tumour on the first occasion may have disappeared completely at the second examination Some patients may be very constipated without complaining of being so

If X-ray facilities are available it is usually not difficult to determine whether the mass is or is not within the bowel, even if the exact nature of the pathology is not immediately obvious If on complete barium-meal examination of the entire intestinal tract all features appear within normal limits, it is most unlikely that there is a neoplasm or other form of bowel mass present within the digestive tract X-ray facilities are still usually only available in the larger centres in tropical countries The majority of doctors working in these parts of the world are without such facilities The position is, however, improving constantly in this respect If a patient needs to be X-rayed it may be necessary to transport him a long distance, at much inconvenience, to the nearest large station where there is a suitable apparatus available In the absence of X-ray facilities a detailed

20 miles away While waiting for transport the grandmother prepared an enema of a highly irritant type and administered it to the patient Although the patient remained apparently completely unconscious, her bowels moved copiously Some minutes later she appeared to wake up and said that she felt sleepy The child was very markedly improved and her pulse was better



FIG 28
Monument to a person who died as a result of a native enema

following the bowel action, she was therefore returned to bed and let sleep until morning She was not taken to hospital The next morning she had no recollection of the alarming events of the past night

This case is mentioned as it bears a marked resemblance to the condition well known in the Philippine Islands as "Bangungut" or, being interpreted, "death during sleep" Such a condition is well known in that part of the world Four hundred and sixty cases were reported in official records in twenty-three years as described by Cruz [29] The condition seen there is said to affect males only and not females *It is described as death during sleep associated with an apparent nightmare struggle* and occurs notably after the patient has taken a large meal before retiring to bed On post-mortem examination of these cases marked

associated with an intestinal mass is a point definitely against carcinoma being present, the condition being more likely to be an amœboma An amœboma of the sigmoid colon and a case of diverticulitis are much more like each other Smith and Clow,[30] working in Shansi Province, North-West China, encountered four cases of amœboma in six months Each was associated with an abdominal tumour Ch'en Ming-Chai and Ch'en Wang Chan-Chu [31] report many cases of *Schistosoma japonica* causing intestinal obstruction and simulating carcinoma of the colon This lesion is found to be in the rectosigmoid area in about 75 per cent of the cases Of forty cases of this form of obstruction treated in the Far East under their care, fourteen of the patients had carcinoma in addition The possibility of the two conditions coexisting must be kept in mind The finding of schistosome ova in motions or on rectal biopsy permits of the assumption that the mass detected in the bowel may be of schistosome origin, but it is not essentially so The finding of *Entamœba histolytica* cysts is of the same order, it can be assumed if *E histolytica* cysts are present in the specimens examined that the mass felt within the abdomen may be due to an amœboma, but it is again not necessarily so Where positive findings for either of these conditions are detected in patients it is permissible to treat the patient with the appropriate drug, emetine for amœboma and antimony preparations for schistosomiasis, and note the result

Regarding the rate of improvement which may be expected in the case of amœboma it will be of interest to record some observations made on a case of an amœboma of the rectum The condition was given twelve injections of emetine during twelve days, 1 gr daily The actual condition was examined almost daily with the following result —

First four days no apparent improvement
Second four days slight but definite improvement
Third four days remarkably rapid and spectacular improvement

It is likely that a mass in the colon which cannot be examined other than through the abdominal wall might be expected to show slight improvement on the completion of one week's treatment and marked improvement after two weeks If this is found to be the case in any patient suffering from a colonic mass, operation should certainly be put off and the matter reconsidered after a further two weeks If X-ray facilities are available an improvement in the narrowing of the gut would be strongly suggestive of a non-malignant condition Such a case should then be kept under periodic observation during the next twelve months Improvement may also be expected with schistosome masses but the rate of improvement is not so rapid In all cases where schistosomiasis is suspected a cystoscopic examination of the bladder should be undertaken also in addition to colon examinations and centrifuged urine examined microscopically

Considering the widespread nature of schistosomiasis as a disease, other lesions should be looked for at any site where they may occur In the case of amœbiasis peri-anal skin lesions may be found in the form of small painful ulcers with considerable discharge from them They are invariably very painful Michael and Cooray,[32] working in Ceylon, succeeded in culturing *E histolytica* from stool specimens using St John and Balamuth's medium with penicillin added

and accurate history and clinical examination of various forms are the alternative means of arriving at the diagnosis The absence of facilities obliges the doctor to rely entirely on these methods of examination On observing cases transferred from out-stations, where no X-ray facilities are available, it would appear that the diagnosis is frequently more accurate in the absence of X-ray facilities than in places where such facilities are available The taking of a good history and carrying out a careful physical examination of a patient are undoubtedly of greater value than radiography alone Radiography should be considered in terms of a confirmatory method of examination

The three major conditions which are seen in tropical surgical practice, giving rise to an abdominal mass and which require careful differentiation, are carcinoma of the colon, amœboma of the large gut and schistosomiasis of the large intestine As the treatment of each of these conditions is quite different it is essential before undertaking any treatment, whether operative or non-operative, to arrive at an accurate and precise diagnosis of the nature of the condition to be treated The diagnosis may be direct by sigmoidoscopy and biopsy finding the cause and confirming it microscopically in the case of rectal disease or by a process of elimination, using several forms of examination X-ray of the large intestine, where this can be carried out, can only indicate a narrowing of the bowel The cause of the narrowing must be determined by other means where possible

Carcinoma of the large bowel is usually a more localised lesion than either an amœboma or a mass due to schistosomiasis The narrowing produced in both of the latter conditions extends over a longer distance than is usual in cases of carcinoma This character seen in barium X-ray films gives the feature known as the "string like appearance" in the case of the two latter non-malignant conditions If there is a palpable abdominal mass and an alteration in bowel habit and an abnormality in the nature of the stool specimens a tumour can usually be considered likely to be of intestinal origin

An amœboma or a schistosome mass should not be suspected unless there is definite microscopic evidence of either of these conditions detected elsewhere in the body The most likely sites for amœbæ or amœbic cysts to be found is in fresh stool specimens or by sigmoidoscopic examination of the rectum and sigmoid colon Amœboma may sometimes be detected in female patients on examination of secretions from the uterine cervix or vagina Heilbrunn,[29] working in Borneo, points out the importance of this examination, indicating the errors in diagnosis which may be made if it is omitted In the case of schistosomiasis both the lower bowel must be carefully examined as well as the urinary bladder These are the two most commonly affected parts of the body in this condition From personal observations of a limited number of cases of amœboma, it seems that an amœboma is usually a painful mass whereas carcinoma is usually much less painful or not painful until very advanced An amœboma of the rectum is a good example, as it can be seen directly, felt with the finger and its progress noted under treatment A carcinoma might reasonably be termed an uncomfortable condition when digitally examined, but an amœboma is definitely a painful condition The secondary involvement of the skin by an amœboma is an extremely painful condition quite unlike a skin carcinoma The element of pain

to a sedimentation rate test, but read in a different manner In any condition where there is a rapid breakdown of tissue there is usually a raised sedimentation rate In patients worrying about the possibility of malignancy where no evidence of the condition can be detected on physical examination, a sedimentation test can be most useful in reassuring a patient It is most unlikely that a patient has malignant disease anywhere if the sedimentation rate is within normal levels Considering the ease with which Bolan's test can be undertaken, it is worthy of consideration

In the case of young patients, a mass of ascaris worms may give rise to a palpable abdominal tumour The condition is usually associated with vomiting as a partial high intestinal obstruction is caused by the mass or worms Any form of high intestinal obstruction gives rise to early vomiting, as opposed to intestinal obstruction in the large bowel Vomiting is rare in large bowel obstructions Tumours of the small intestine are almost invariably benign,

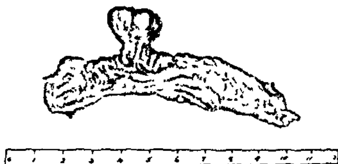


Fig 29
Benign tumour of small gut which precipitated an intussusception

they give rise to colicky pains at times, but are usually of small size and are not detected until an acute episode occurs A small intestine tumour may give rise to an intussusception Fig 29 shows such a tumour which was removed with an irreducible intussusception, which was resected

Schistosomiasis may occur at the terminal part of the small intestine, giving rise to a condition closely resembling Crohn's regional ileitis The thickening of intestine due to schistosomiasis is more commonly seen in the large gut The rectum and sigmoid areas of the large bowel are affected in an overwhelming proportion of the cases The genito-urinary tract may also be heavily infected as well as many other sites in the body to a lesser extent

Rare fungoid conditions sometimes occur in the intestinal tract, giving rise to tumour formation The true nature of such tumours is seldom diagnosed before operation Many of the fungoid diseases tend to fistula formation Intestinal fungoid conditions are usually associated with other manifestations of a similar fungoid nature growing elsewhere in the body The remote possibility of such diseases should be remembered, especially in view of the predisposition

to it, this inhibits the growth of some of the bacteria present and facilitates the culture of *E histolytica* This procedure may be helpful if laboratory facilities are available

In a case where there is an intra abdominal mass present that is thought to be a carcinoma of the colon but might be otherwise, skin tests for schistosomiasis may be very useful where no schistosome ova have been found on stool examination

93 91 per cent correct in in-patients, it being easier in the latter group to make accurate observations at the correct time Chung Huei-Lan, Weng Hsin-Chih and Li Jung,[35] working in Peking, China, have found a very high proportion of positive skin tests in schistosomiasis cases using experimentally infected rabbit liver suspension with which to perform the test Skin testing for schistosomiasis seems to be of great value in cases where the condition is suspected, but the ova cannot be found on examination of urine or fæces It would be most helpful to have suitable material prepared at laboratory centres where facilities are available It is not easy to prepare the material for skin testing in the stations where it would be most useful—in remote country stations A central supply for issue in small quantities to up-country hospitals would be a great advantage in helping to diagnose schistosomiasis in difficult cases If no evidence of either schistosomiasis or amœbiasis can be detected in a patient with a bowel tumour and a skin test is negative, the presumption is that the mass present is a malignant growth

Bolan [36] has carried out a very large series of tests on samples of blood taken from patients with and without malignant disease Working in co-operation with the surgical staffs he tested 525 patients, the nature of whose illness was not known to him, and in 90 per cent of the cases his test for malignancy proved to be correct, as subsequently found either at operation or at post-mortem examination The test already referred to consists of making a "thick drop" blood preparation on a glass slide placed horizontally and allowing it to dry in the air The pattern assumed by the blood as it dries varies according to the alteration in serum proteins produced by the disease present If the serum proteins are normal the red cells tend to collect uniformly in the inner two-thirds of the drop of blood as seen when it is dried The outer third of the dried drop contains very few red cells In advanced malignancy the red cells are collected together into many clumps spread over the complete drop, but separated by narrow channels of dried clear serum The appearance looks somewhat like that seen when in cross-matching blood for transfusion an incompatibility is encountered Early malignancy shows an appearance intermediate between the two extremes This is a very simple test and well worth carrying out, as it can be undertaken during the ward round and examined at the end of the round by which time the blood will have dried False positives may occur in cases of extensive non-malignant liver disease The test is also upset by the giving of intravenous saline or blood transfusion Pregnancy also upsets the test The test would appear to be one for the detection of an alteration in blood protein and is therefore very comparable

FORMS OF DYSENTERY IN SURGERY

In considering the surgical aspects of dysentery the term is used in a wide sense In very severe cases there may be blood mixed with the motions passed There is a very large number of causes of diarrhœa seen in medical and surgical practice in the tropics The term "bacillary dysentery," at one time used in rather a wide sense, has in latter years been narrowed down to the acute dysenteries caused by the Shigella group of organisms, the bacilli of Shiga, Flexner, Schmidt and Sonne Shiga's dysentery is the most serious and Sonne's dysentery the least dangerous Sonne's dysentery is very infectious, and if it once gets into a surgical ward many members of the staff as well as patients may become affected very quickly The death-rate in Shiga's dysentery is very low, although the patients may be very ill and most uncomfortable In Sonne's dysentery the death rate appears to be practically nil If, however, the bacillary dysenteries are superimposed on another illness, the effects may be extremely serious in an already debilitated person The dysenteries caused by the Shigella group of organisms are fortunately *very responsive to the sulpha group of drugs* The insoluble forms, such as sulphaguanadine and sulfasuxidine are most suitable for the treatment of *these conditions They act locally and are scarcely absorbed at all* The tetracycline antibiotics are also very effective in bacillary dysentery (Murphy[37]) Although this group of organisms accounts for a high proportion of the dysenteries of temperate countries, it is responsible for only a proportion of the dysenteries of tropical countries

Vibrio choleræ cause a severe dysentery with a very high death-rate Mass epidemics are most common in Asia The condition is infrequent in Europe and Africa *There was an outbreak of cholera in Egypt in 1947 with a 50 per cent* death-rate During a pandemic of cholera the disease appeared at MacCarthy Island settlement in Gambia, West Africa, in 1869 It is supposed to have come from Morocco to St Louis, then up the Senegal River to the hinterland and subsequently down the course of the Gambia River At MacCarthy Island Settlement in the Gambia River ninety-three people died out of a population of 400 residents The disease travelled down the river and appeared at Bathurst in May *1869 Between then and the end of the epidemic in October* 1869, 1,200 deaths occurred in Bathurst from cholera in a population of 4,000 inhabitants This information was originally given to me by an elderly African patient for whom a cataract operation was undertaken in 1936 He was a very small boy at the time of the epidemic but remembered it very well It has recently been confirmed and amplified from official records by the Director of Medical Services, Gambia, and his staff (Jones[38]) Many Mohammedan pilgrims going from West Africa to Mecca are now inoculated against cholera

The risk of cholera being transported from one part of the world to another with rapid air transport is considerable and the condition may therefore occur in places other than in its usual endemic location in parts of Asia Because of the very severe diarrhœa in cholera there is marked *dehydration of the patient* Replacement of fluid and electrolytes is most important Rogers' method of

of fungoid pathology being increased by the free use of antibiotic drugs in recent years All intestinal tumours removed at operation should be sectioned without exception, as the prognosis is dependent on the microscopic findings The nature of the tumour should be ascertained with certainty in every case

In tropical surgical practice, chronic intussusception in adults is seen quite frequently The condition appears to be much more common in the tropics than in temperate climates In all such cases encountered the mass has invariably been found on the right side of the abdomen In no case has the apex of the mass reached beyond the midpoint of the transverse colon If the condition proceeds beyond this point urgent symptoms occur and the patient is rushed into hospital In a very high proportion of the chronic intussusception cases dealt with, the mass was at the position of the hepatic flexure of the colon

In acute and subacute intestinal obstruction the loop above the obstruction fills with fluid and this may give rise to a localised mass, but it has a uniform surface which is not likely to be confused with a true tumour in the usually accepted sense of the term In such cases there is a short history and urgent symptoms

Tumour masses within the cæcum give rise to symptoms and signs rather late, as obstruction does not easily occur because of the wide calibre of the gut at this site and the fluid consistency of the intestinal contents Because of the advanced stage of disease, when it does become apparent, there may be extensive ulceration with secondary hæmorrhages and the marked anæmia which may result is frequently noted

It is most important, in examining the abdomen, to listen carefully to the bowel sounds The high note associated with acute obstructions is very characteristic, but in cases of lesser degrees of obstruction, and even in cases of chronic low grade partial obstruction, there may be a marked abnormality of the sounds present To be able to detect early changes in bowel sounds is most valuable

[illegible]

fossa area These cases need to be investigated to ascertain the nature of the pathology giving rise to the condition

In tropical surgery no operation should be undertaken for a presumed carcinoma of the colon until an extensive examination has been carried out to exclude amœboma and schistosomiasis Mistakes have been reported of cases where radical surgery has been undertaken in error because adequate care was not taken to exclude non-malignant conditions Schistosomiasis and amœbiasis are both very responsive to treatment by the appropriate forms of injection Surgery should not be undertaken in these conditions unless an urgent emergency arises, with obstruction or perforation which may occur in rare cases The death-rate following operation in such cases is extremely high

use of vitamin B_{12} This form of treatment was tried on the analogy that ulceration elsewhere in the body is often much improved by the administration of vitamin B_{12} This preparation might reasonably be used as a tonic following an attack of any of the dysenteries

In India it was popular to undertake an ileostomy in cases of chronic ulcerative colitis with a view to resting the colon and thus aiding healing of chronic ulcers of the large gut The practice is now seldom undertaken Ulcerative colitis does not appear to be common in African patients

In the case of young children in the tropics with acute diarrhœa a high proportion of these patients have a heavy infection of malaria parasites in the blood The diarrhœa settles down very quickly when the malaria is treated, even though no treatment is given for bacillary dysentery It seems that malaria can be the cause of the diarrhœa, particularly in children The desirability of treating malaria before any surgery is undertaken has already been stressed

There has been much dispute about the pathogenicity of Giardia This form of protozoa can frequently be found in the intestinal tract in patients in the tropics Coelho [42] found that in Indian children chronic diarrhœa was commonly associated with a heavy infection of Giardia This form of infection can be treated successfully with full courses of mepacrine It is necessary to exercise care to avoid toxic symptoms when mepacrine is used, mental upsets may be precipitated by this drug and any excitability should be an indication to stop the preparation at once Stovarsol has also been used with satisfaction in giardiasis, it appears to cure the condition also Balantidial dysentery, also a protozoal intestinal infection, may give rise to chronic dysentery Kennedy and Stewart [43] report a case of a small boy who had chronic diarrhœa for five years due to *Balantidium coli* The case was treated with success, using stovarsol after failure by other methods *Bal coli* is a parasite found commonly in the intestinal tract of pigs The infestation rate in pigs is very variable In Kenya, infection of pigs amounts to 32 per cent of animals examined In Ireland the infection rate in pigs is 74 per cent while in Russia the infection rate is given as 100 per cent

Helminthic infections of various sorts have been blamed for attacks of acute dysentery, but it is difficult to assess to what degree they are responsible If in a population there is a high helminthic infestation rate and worm ova are noted in specimens being examined for dysentery, the helminthic infection cannot necessarily be considered to be the cause of the diarrhœa If the worm infection was the cause of the diarrhœa, one might expect that the dysentery would continue until the worm infection was treated, but this is not the case It is, however, likely that a heavy infection by any form of helminthic parasite may produce an unhealthy state of the intestinal mucous membrane predisposing to the occurrence of bacillary dysentery more easily than in a patient who has a healthy intestinal tract The desirability of treating all patients before surgery for worm infections has already been stressed

Any of the Schistosoma group of trematode worms may give rise to an unhealthy state of the intestinal mucous membrane, the large gut is mostly affected as well as the urinary tract Almost all organs of the body may be affected

estimating the degree of dehydration has been mentioned in Chapter 2 As with the Shiga group of diseases, the sulpha drugs as well as the tetracycline antibiotics appear to be effective in killing off cholera organisms Dysentery as a complication of any surgical condition is very serious, whether this occurs at a time when an emergency operation is imminent, such as Cæsarean section for obstructed labour, or following an operation during early convalescence Most of the cases of [illegible] is usually a marked increase [illegible] this is probably associated [illegible] lay an operation is planned a patient is found to have an acute attack of diarrhœa, any form of surgery should be postponed In the case of very urgent emergencies individual consideration must be given

In patients who develop chest complication following anæsthesia there may be much infected sputum produced, this material is in most cases highly infected and if swallowed may cause a low grade diarrhœa Surgical patients should always be encouraged to spit out infected sputum rather than swallow it This condition is seldom mentioned though it is very commonly seen Staphylococcal and streptococcal food poisoning, giving rise to diarrhœa, has been described but so far it has not been recognised personally

The diarrhœa associated with a tuberculous enteritis is usually of a terminal nature in a patient suffering from an advanced tuberculosis of the lungs The prognosis is very serious, most of these patients die At post-mortem examination multiple ulcers of the large bowel are commonly seen, particularly about the area of the cæcum

Typhoid fever is a particular form of enteritis, constipation is more common in this condition than diarrhœa The surgical aspects of typhoid fever have already been considered

In the majority of country stations in the tropics there are very few facilities available for undertaking bacteriological investigation other than microscopy of specimens Blood, urine and stool specimens should be looked at to see if any characteristic ova, cyst or parasites can be found which might account for the dysenteric condition Since the introduction of the sulphonilamide group of drugs the prognosis in bacillary dysentery of all sorts is greatly improved Although the mortality rate of bacillary dysentery was never very high there was much chronic illness due to bacillary dysentery before the sulpha drugs were introduced Bacillary dysentery is probably more common than amœbic dysentery in all tropical areas The relative frequency varies from place to place Rao,[39] writing from India, noted 316 cases of dysentery in a certain period, of these, 89 were amœbic in type while 227 were of the bacillary variety Boyd,[40] speaking from his personal experience on the dysenteries, comments on the success of the sulpha drugs in the case of the bacillary dysenteries Before the introduction of these drugs the condition often became chronic in nature and remained troublesome for many years Bacteriophage has been tried in the treatment of the bacillary dysenteries, but although active *in vitro* it is generally considered to be of no value in clinical practice In cases of ulcerative colitis considered not to be of amœbic origin, Rail[41] noted that these cases were markedly improved by the

and diarrhœa Mushrooms, on occasions, also give rise to a severe enteritis Atropin counteracts the effects of muscarine to some extent

In view of the wide range of substances giving rise to diarrhœa apart from bacterial infections it is important to get a good history from the patient Patients in a poor nutritional state, suffering from avitaminosis, are also liable to suffer from diarrhœa, as the intestinal tract is usually in an unhealthy state Beriberi and pellagra are the two vitamin deficiency conditions most likely to be associated with diarrhœa Signs of avitaminosis should be kept in mind when examining any patient suffering from diarrhœa, particularly those patients who have a low grade chronic condition present Tropical sprue gives rise to diarrhœa, with special characteristics Amœbic dysentery is dealt with separately because of special features of surgical importance

It is most important to realise that a patient may complain of diarrhœa after an operation, and if this occurs it is essential to examine the patient to see that some complication is not occurring a pelvic abscess may be giving rise to the rectal irritation Tenesmus and rectal discomfort may occur and small amounts of mucus be passed per rectum rather than true diarrhœa The proctitis which occurs due to a native enema initially has diarrhœa associated with it due to the irritation Constipation then develops with the onset of pelvic peritonitis and the patient may be very ill After the patient recovers from the pelvic peritonitis, within a week or ten days there is usually a further attack of diarrhœa In some cases there may be sloughing of the mucous membrane of the rectum The sequence of events as noted in patients in West Africa is very suggestive of the condition of chiufa seen in Rhodesia, the cause of which has not been ascertained precisely

Any form of neoplasia or granuloma formation within the large bowel gives rise to altered bowel habits, with attacks of diarrhœa and the passage of blood and mucus per rectum at times These symptoms occur in malignant disease and amœboma as well as in some cases of schistosomiasis

In cases of lymphogranuloma of the rectum in female patients there may be a complaint of diarrhœa but in fact the patient is found to be suffering from an incontinent anal sphincter muscle with associated ulceration, and there is lack of control rather than true diarrhœa

It is necessary to examine very carefully any patient who is admitted to hospital with symptoms suggestive of dysentery Cases of intussusception may be admitted with a history of abdominal pain and diarrhœa They do not have true diarrhœa but pass small amounts of blood stained mucus, produced by the congested state of the intussusceptum It is absolutely essential to exclude the possibility of an acute surgical condition before a patient is ordered a course of sulphaguanidine or other sulpha drug All cases complaining of dysentery should be examined a second time within eight hours following the initial treatment ordered

Mesenteric thrombosis gives rise to very severe abdominal pains and this is followed by diarrhœa with blood staining of the motion passed In almost all cases the patient is very shocked and there is usually a marked irregularity of the pulse The condition usually occurs in elderly patients with a very poor cardiac action, and is seen much more frequently in temperate climates than in the tropics

to lesser extents by schistosomes Intestinal schistosomiasis may cause diarrhœa This matter is considered more fully in Chapter 9

In recent years there have been several cases reported where a chronic dysenteric condition has been induced by giving antibiotic drugs Gamble and Harris [2] report such a case following the use of tetracycline antibiotic drugs The causative organism in this case was *Pseudomonas pyocyanea* Holgate [3] reported a similar fatal case where a pyocyaneus infection occurred following the use of the tetracycline antibiotics Fever, diarrhœa and abdominal pains are prominent symptoms and the patient goes into a typhoid like state The condition is an extremely serious one The fatality rate is about 40 per cent in this form of enterocolitis This form of dysentery may well be seen in a surgical ward where antibiotic drugs are now used of necessity in large quantities on occasions The patients with this condition who do recover are extremely ill before improvement takes place

Antibiotic drugs should not be continued for more than five days if they appear to be ineffective in the treatment of the condition for which they are given, as they carry with them a high risk of intestinal complications The tetracycline group of drugs are particularly liable to precipitate intestinal complications The growth of fungoid infections may also be much increased in the intestinal tract following the use of antibiotic drugs and dysenteric symptoms may result Most of the intestinal fungoid diseases are liable to produce diarrhœa Histoplasmosis affecting the intestinal tract was reported from Kenya by Davies [13], intestinal lesions were present associated with diarrhœa Whereas *Entamœba coli* is usually considered to be non pathogenic, it would appear from cases seen that it may give rise to a low grade diarrhœa, and it is better treated with a course of emetine if it produces symptoms An enteritis may be produced by drugs The drug most commonly responsible in the tropics for an attack of diarrhœa is stovarsol This drug is purchased on occasions without a prescription and used very injudiciously Many of the cases of diarrhœa from this cause later develop an associated dermatitis of the arsenical type Care should be exercised that in giving tonics following operations diarrhœa is not produced by the use of strychnine Many patients are very susceptible to the effect of this drug and crampy abdominal pains with diarrhœa may be produced inadvertently

There is a very large number of tropical fruits and vegetable matter which give rise to acute enteritis Experience in the particular district is necessary in order to become familiar with the trees and plants which cause poisoning Some of these are well known, such as *ackee* fruit Many of these trees have been imported from the West Indies to West Africa for ornamental purposes The unripe fruit gives rise to an acute toxic hypoglycæmia due to the action of the saponin contained in it Most of the poison victims are young children between the ages of 3 and 6 years, old enough to leave their mothers and not old enough to differentiate between the ripe and the unripe fruit, the latter only being poisonous In one station visted in West Africa the medical officer sees as many as ten to fifteen of these cases annually, with several deaths The nuts from coral plants cause diarrhœa The fruit of the manchineel tree also causes diarrhœa, which may be severe and hæmorrhagic Poison yams may cause severe abdominal pain

the specimen being passed The vegetative form becomes inactive within less than one hour The examination for the cysts is not such a matter of urgency as is the examination for the vegetative forms

The diagnosis of amœbiasis depends on the finding of either the amœbæ themselves or the cysts of the parasite Whereas amœbic dysentery is usually considered to be a condition treatable entirely by medical means, a small proportion of the cases develop complications requiring surgical treatment The fact that amœbic conditions require to be differentiated from many other conditions requiring surgical treatment necessitates an appreciation of the condition at all stages In view of the common observation that the cysts of *E histolytica* are commonly found in patients who have no acute symptoms, it would appear that the condition is in the nature of a low-grade colitis with ulceration in some cases only There seems to be considerable evidence to suggest that the clinical symptoms of the nature of an acute enterocolitis in patients in whom *E histolytica* cysts are found are probably due to the effect of a bacillary dysentery superimposed on an unhealthy large bowel caused by the presence of *E histolytica* A high proportion of the patients suffering from subacute colitis, and found to have *E histolytica* cysts in specimens of motions examined, settle down rapidly on taking sulphaguanidine or sulfasuxidine Phillips, Wolfe and Bartgis [11] note that *E histolytica* fails to remain alive for more than a few days, or produce lesions, in the germ-free cæcum of experimentally prepared guinea-pigs Small temporary ulcers occurred if local trauma was initially produced in the cæcum The amœbæ do not develop in the absence of bacteria Bacteria are essentially involved in the ætiology of amœbic dysentery

Recollecting a large number of patients seen over many years, in whom *E histolytica* was found, it is quite noticeable to observe the conspicuous absence of an appearance of ill-health so long as the condition remains within the intestinal tract The majority of patients with *E histolytica* cysts in motions and low-grade intermittent diarrhœa look remarkably well

Amœbiasis due to *E histolytica* may be considered a serious disease because of the chronicity of the condition and the complication to which it may give rise Marked bowel thickening may be produced by this condition and this gives rise to some difficulty in diagnosis at times The thickening produced may give rise to a mass very like a carcinoma of the colon Perforation of an amœbic colonic mass sometimes occurs and this is a very serious complication Internal fistulæ may also be caused by amœbiasis

If cysts or vegetative forms of *E histolytica* are not found in specimens of motions passed by a patient with colonic symptoms, sigmoidoscopy may be necessary By sigmoidoscopy, bowel changes suggestive of amœbic dysentery may be seen and specimens of mucus removed direct from the surface of the rectum for examination for entamœbæ and cysts Removal of tissue from the edge of a rectal ulcer may be necessary in order to determine the precise nature of the pathology, whether amœbic or malignant It is not unusual to find that patients in whom *E histolytica* cysts are found have had repeated negative examinations reported for the condition These cysts appear to "come in rushes" Sometimes many can be found quite easily and at other times none can be found

Following the release of an intestinal obstruction of the small bowel there may be a large quantity of fluid from the upper bowel entering the colon and this gives rise to diarrhœa This form of diarrhœa causes marked collapse The fluid of the small gut in these cases contains histamine and there is a marked drop in the blood pressure It is advisable to anticipate this fall in blood-pressure and give stimulants to combat the condition before it becomes obvious and the patient's condition deteriorates Cortisone is a help and may be given in intravenous saline or intramuscularly (100 mg dose) Antihistamine drugs are also beneficial

Any form of dysentery during pregnancy is very dangerous and a potent cause of abortion The possibility of drastic purgatives being taken as a calculated measure to terminate a pregnancy should be kept in mind in cases where an early pregnancy is present, reference has been made to a case seen of naphthalene poisoning in such a circumstance A very severe hæmorrhagic diarrhœa was caused by this means and was associated with a severe hæmolytic anæmia The patient recovered after a blood transfusion and other supportive measures

Following some forms of snake-bite there may be collapse and diarrhœa and in late cases an accurate history may not be elicited

In cases of enterocolitis it is essential to treat the cause of the condition and give strong sedatives as well as replace lost fluids by whatever may be the most suitable means In patients who are not vomiting, fluids may be replaced by mouth, but in severe cases it is better to replace the lost fluids by giving intravenous saline glucose

AMŒBIC DYSENTERY AND ITS COMPLICATIONS

Amœbiasis is a generalised disease affecting almost all systems of the body to variable extents The condition is caused by the protozoan Entamœba There is a very large number of varieties of entamœbæ known in parasitology The outstanding member of the group is *Entamœba histolytica* *E coli* and *E nana* are also not infrequently found in man, but the former is of very low-grade pathogenicity and *E nana* does not appear to give rise to clinical symptoms at all Some authorities consider *E coli* to be non-pathogenic There is a vegetative and cystic form of *E histolytica* and *E coli* Personal experience suggests that *E coli* gives rise to a low-grade form of enterocolitis and the condition needs treatment in some instances No metastatic complications appear to be caused by *E coli*, it is therefore much less serious than *E histolytica* Amœbiasis is contracted by the ingestion of amœbic cysts as a contamination of food *E coli* infections are contracted in the same manner If it is agreed that *E coli* causes symptoms then it needs to be treated Those who consider it to be non-pathogenic do not give treatment, this is a moot point, allowing of latitude of personal opinion The [illegible]

ca [illegible]

ca [illegible]

being investigated" The cysts and vegetative form of *E histolytica* are found in patients suffering from a low-grade chronic colitis In order to find the vegetative forms of the parasite it is necessary to examine fæces within fifteen minutes of

gut infections gave a positive complement fixation test for amœbiasis but that 86 per cent of the cases gave a positive result when the liver became infected The antigen used by these workers was prepared by Hyson, Westcott & Dunning Inc, an American trade firm Complement fixation tests may be useful also in cases where a pulmonary infection with amœbiasis is suspected The test is negative in other enlarged liver conditions, it is therefore of considerable value in cases where there is a tender enlarged liver and tests for *intestinal amœbiasis* are negative It is useful in differentiating liver amœbiasis and carcinoma of the liver which may at times cause difficulty in differential diagnosis

Kashwal,[5] working in Jaipur in South east India, saw an enormous number of cases of amœbic dysentery Between 1951 and 1953, 506 cases were treated for amœbiasis out of a total medical admission list of 7,407 patients, this represented 7 per cent of all medical patients treated in hospital Very few if *any doctors in Africa have seen as many cases as this in their entire professional* life To see such a large number of cases of this condition within two to three years certainly gave ample opportunity of gaining valuable experience in dealing with the condition The symptoms listed as being due to the disease are given, with percentages of cases in which individual symptoms were noted

Vague abdominal pains, 45 per cent
Chronic diarrhœa, 15 per cent
Windy indigestion, 15 per cent
Insomnia and mental upsets, 10 per cent
Other symptoms, 15 per cent

Amœbic dysentery appears to be much more common in India and China than in Africa Thickening of the colon was noted in a remarkably high proportion of the cases by Kashwal—80 per cent This is not the experience of doctors working in Africa where *thickening of the colon is noted only on rare occasions*, it is certainly not common

Amœbiasis being a generalised disease entering the gut primarily, but later spreading via the portal circulation and thence to other parts of the body, has many manifestations at various sites in the body There are many extra-colonic complications of amœbic dysentery and the following are well recognised though not very common in most cases

Amœbic hepatitis
Amœbic liver abscess
Pulmonary amœbiasis
Amœbic pericarditis
Amœbic brain abscess
Amœbic abscess of the spleen
Urinary amœbiasis
Amœbiasis cutis

is
y
error d
involvement of the walls of the vagina [illegible]

even with repeated and prolonged examination Chatterji[45] suggested that cysts ... was given one or two injections of emetine ... calomel at night, with salts next morning ... en be found in the fluid motions produced where previous examinations proved negative

Amœbiasis is a very widespread disease and it is more common in the tropics than in temperate climates Lepes,[46] working in Yugoslavia, found that on examining school children from different localities in that country the infection rate with *E histolytica* cysts varied greatly, being from 5 per cent in some places to 60 per cent in others The majority of the children had either no symptoms at all or low-grade chronic colitis Amœbiasis appears to be rather worse in damp areas than in dry places Helman[47] mentions that amœbiasis is unknown in South West Africa amongst the Hottentot people At almost the same latitude in the Natal area of the East Coast of Africa Isaacson[48] reports that 10 per cent of all the medical admissions to one local hospital were for the treatment of amœbic dysentery, thirty-seven cases being admitted out of a total of 370 cases in the period under consideration Two-thirds of the cases seen by Isaacson suffered from intestinal symptoms alone and one-third were treated for amœbic hepatitis in addition

On examination of routine specimens of stools in West African patients probably not more than about 2 to 5 per cent of the specimens are found to contain *E histolytica* cysts Only a small proportion of those in whom cysts are found complain of symptoms suggestive of amœbic dysentery When looking for *E histolytica* cysts, it is an advantage to obtain if possible a portion of mucus from the specimen if available The specimen is emulsified with a few drops of saline and a drop of weak iodine solution added The cysts are much more easily recognised if this is done If a patient is given a dose of castor oil before the cysts are looked for it is very difficult to recognise the cysts quickly, even if present, as so many oil particles are present, looking very like cysts, but of course not having the central nuclear formation, much time can be wasted if this happens Castor oil is, however, not used so much nowadays as an aperient as in the past In cases where *E histolytica* could not be found in specimens of stool Michael and Gooray,[39] working in Ceylon, succeeded in culturing *E histolytica* on the medium of St John and Balamuth to which penicillin had been added, the penicillin retarded the growth of bacteria facilitating the growth of the vegetative forms of *E histolytica*

Amœbiasis occurs in children as well as in adults Tupas and Dauis-Lawas[49] report two cases from the Philippine Islands where the infection occurred in young children and refers to many others previously reported The fact that young children have unformed motions and cannot give a history of their illness probably accounts for the lack of search made for amœbiasis in young children The diagnosis of amœbiasis of the intestine by complement fixation is not helpful, only a small proportion of chronic cases give positive results Complement-fixation methods are of some value in hepatic amœbiasis Hussey and Brown[50] found only 2 4 per cent positive complement-fixation tests for amœbiasis in colonic cases, but McDearman and Dunham[51] note that in their series 15 per cent of

The site of amœbic ulceration of the colon was found by Radke [57] to be

Rectum, 32 per cent
Cæcum, 28 per cent
Transverse colon, 12 per cent
Sigmoid colon, 7 per cent
Ascending colon, 7 per cent
Descending colon, 4 per cent
Variable other sites, 10 per cent

This writer lists the complications in order of frequency as intestinal obstruction, cutaneous amœbiasis and liver abscess in that order, other complications being comparatively less frequently found It seems that hepatitis and liver abscess are the most frequent complications in West Africa Intestinal obstruction due to amœbiasis is not at all common, though cases are occasionally seen Speaking of the sex incidence, Radke noted sixty-four of the patients in whom complications occurred were males and only eight were females Amœbiasis is undoubtedly more commonly detected in male patients than female patients Radke considered that thickening of the large gut at some part was a very frequent finding, but this has not been noted in many of the amœbic dysentery cases seen by me Operation undertaken on the bowel in cases of amœbiasis is associated with a very high mortality rate, 50 per cent being not an uncommon finding Surgery should be avoided wherever possible unless acute symptoms supervene, such as perforation or acute obstruction



FIG 30
Amœboma of the skin secondary to amœbic liver abscess

If in an emergency caused by obstruction or perforation a mass has to be excised, there should be a very wide margin allowed above and below the lesion in order to reach reasonably healthy tissue with which to reconstruct an anastomosis Anderson,[58] working in East Africa, noted cases of amœbiasis of the cæcum giving rise to symptoms suggestive of appendicitis Cæcal thickening suggestive of a carcinoma was also noted Intussusception in children was thought to be due to amœbiasis on frequent occasions, this is not a very usual experience with other workers In the case of chronic intussusception, the possibility of amœbiasis might be considered as an ætiological factor Amœbiasis is probably seldom looked for in cases of intussusception, though it might reasonably be considered Chronic intussusception is more common in adults than children

In considering the diagnosis of any mass in the large intestine the differential diagnosis between carcinoma, amœbiasis and schistosomiasis must be taken into

several of these cases and pointed out the likely error which may be made in diagnosis between this condition and carcinoma of the uterine cervix This contribution to the literature is of very considerable value The particular characteristic distinguishing it from carcinoma is that it tends to be very painful, in addition there may be punched out ulcers of the walls of the vagina These two *characteristics are not noted in carcinoma There is usually much mucus discharge* with blood-staining Microscopic examination of the discharge generally shows many live amœbæ A few cases of this nature were seen in West Africa The condition is seldom looked for and may be much more common than at present appreciated If doubt exists as to the possibility of this condition being present in a remote station where it may not be possible to have a tissue biopsy undertaken to exclude carcinoma, it may be permissible to give a course of emetine and see if the condition clears up on treatment of this sort

In the case of amœboma of skin areas, the amount of jelly-like secretion on the surface of the lesion suggests the diagnosis The condition also is extremely painful, the patients tend to pull away from an examining hand, suggesting that there is severe tenderness caused by the condition Armstrong[53] reported a case where there was a sore over the sacrum, this was found to be due to *E histolytica* Many of the organisms were found in the offensive discharge on the surface

In a small number of cases personally noted there has been a marked similarity of appearance between skin amœbiasis and the subacute phagodenic tropical ulcers seen about the ankles in children Both of the conditions have a greenish-purple appearance, with a jelly like discharge which is blood-stained, both are extremely painful Few examinations have been made by me for amœbæ in the cases of phagodenic ulcers, but the marked similarity of characteristics in the two conditions suggests that such an investigation might be of considerable interest The precise cause of phagodenic ulcers has not been decided though all seem to contain large numbers of spirochætes and fusiform bacilli No record has been noted of amœbæ being looked for in these ulcers

Shaw and Hughes[54] report a case of extensive amœbic ulceration of the skin on the back of the thoracic wall over the level of the right lobe of the liver Infection had presumably come from a broken-down liver abscess Although the patient had no bowel symptoms, amœbæ were found on proctoscopic examination The condition cleared up following a course of emetine A similar case has been reported to me personally by Browne and Wolvetang,[55] working in Ghana A further case of this nature was treated personally in 1957 and a photograph of the condition (Fig 30) is given The condition may be suggested by the extremely painful nature of the sore, the characteristic colour of the surface, and the jelly-like discharge present

Intussusception due to amœbic colitis appears to be a rare complication of amœbic colitis Purandare,[56] in twenty-seven years of pathology, noted only one case of intussusception coming to post-mortem examination associated with amœbic dysentery, where the amœbic condition was thought to be causative of the intussusception In 12,235 post mortem examinations 339 cases of amœbic colitis were found

followed by carcinoma of the parenchymal cells of the liver Chronic ill health and enlargement of the liver may suggest that the condition is one of hepatic amœbiasis *Clonorchis sinensis* ova are found in the specimens of stool as in the case of *Schistosoma mansoni* Hopelli and Wu,[62] commenting on infections of the human liver, mention *Entamœba histolytica*, malaria and Leishmaniasis as being causative factors in hepatic enlargement The schistosome group of diseases is also mentioned *Echinococcus granulosis* or hydatid disease of the liver may also give rise to hepatic enlargement and some difficulty in diagnosis

Cases of hepatic abscess due to ascariasis have been noted by some workers, and such a condition might reasonably give rise to considerable difficulty in cases where amœbic hepatitis is considered the more likely diagnosis The diagnosis of liver enlargement in the tropics may be very difficult in view of the large number of diseases giving rise to enlargement of the organ In all the cases of amœbic hepatitis seen, the patients have been extremely ill with marked sweating, painful enlarged liver and an irregular high fever Most of the cases of amœbic hepatitis seen by me have been European patients, whereas almost all the cases of liver and subphrenic abscess were in African patients

Liver abscesses are not all of amœbic origin Tribedi,[63] from India, analyses a series of forty cases of liver abscess where complications occurred with fatality as noted at post-mortem examination The site of the abscess was noted to be right lobe of the liver, 65 per cent of the cases , left lobe, 10 per cent of the cases , in both the right and left lobes (multiple), 25 per cent of the cases Regarding the number of abscesses present, it was found to be single in 57 per cent of the cases, two abscesses in 17 per cent of the cases and multiple in 26 per cent of the cases Decimals are left out for ease of visualisation The figures are whole-number approximations

In cases where the abscess ruptured, the direction of abscess was indicated as follows to right lung and pleura, 45 per cent , to left lung, 11 per cent , to peritoneum, 22 per cent , to pericardium, 22 per cent These percentages refer to the cases in which rupture of the abscess occurred In only a small proportion of the abscesses seen (eleven cases) did rupture take place A single abscess in the right lobe is the most common type of abscess seen Rupture into the right lung and pleura is the most common complication In a small number of cases seen the abscess had ruptured through the lower part of the thoracic wall close to the lumbocostal angle at the back of the chest In any case where the liver abscess ruptures into the peritoneal cavity the prognosis is very bad All the cases seen in which this occurred have died Such cases usually come into hospital at a late stage and the rupture occurs very soon after admission, usually one or two days later, while the case is being investigated Some cases have been seen where the abscess has opened in a position between the umbilicus and the gall-bladder

In any case where an abscess comes to the surface and opens itself the outlook is poor The case becomes very infected and the patient's general condition deteriorates rapidly No cases have been seen where the abscess in the left lobe has ruptured into the pericardium Gordon[64] reports a case of this type and treated the patient by repeated aspiration of the pericardium, with a successful

account If amœbiasis or schistosomiasis cannot be detected on examination of stool specimens, sigmoidoscopic examination may be most helpful and certainly should be undertaken The findings in sigmoidoscopy are grouped together for the purpose of comparison of the various conditions and considered in Chapter 9 The urine should also be examined in any case where there is a mass in the colon to see if the patient has schistosomiasis which might possibly account for his bowel condition It is much more difficult to find schistosome ova in stool specimens than in urine A schistosome mass in the colon may be due to any of the schistosome group of trematode worms and the most likely type will be suggested by the frequency of the various conditions in different areas of the world Urinary amœbiasis has been described, but it is probably very rare Amœbæ have been seen in urine on one occasion, but they were thought to be a contamination most probably The specimen of urine was from a female patient

Amœbic hepatitis seems to be much the most common complication of amœbiasis seen in Africa The hepatic infection reaches the liver area through the blood stream Pulmonary amœbiasis may also occur but it is rare A case of bronchitis in the tropics is seldom examined for amœbæ If a patient is found to have amœbiasis and develops bronchitis on admission to hospital the condition may be suspected, but it is seldom considered otherwise No cases of cerebral amœbiasis have been recognised Chatterji[45] records the relative frequency of amœbic hepatitis, pulmonary amœbiasis and cerebral amœbiasis as being seen in the proportion of 100 to 10 to 1 He also described amœbic cholecystitis, amœbic splenitis, and amœbic lymphadenitis as well as urinary amœbiasis and bone and joint complications also due to the condition In the absence of finding the actual organism in the lesions described there can only be a presumptive diagnosis of the alleged complications It is obvious that amœbic dysentery and its complications must have been seen by Chatterji very frequently in India It is also obvious from the article of Kasliwal[52] that amœbic dysentery is still much more common in India than Africa, he having seen 506 cases in three years in South-east India

Mathur[59] describes four cases of brucellosis in India with hepatitis simulating amœbic hepatitis The nature of the hepatitis was ultimately determined by agglutination tests Three of the cases were originally diagnosed as amœbic hepatitis and the other as cirrhosis of the liver The condition was considered rare, but an interesting possibility in cases of liver disease In view of the increasing frequency with which brucellosis is being diagnosed in Africa, this possibility should be kept in mind Schistosomiasis of the liver may give rise to difficulty in diagnosis of liver conditions where there is a hepatic enlargement, with discomfort locally and chronic ill-health in addition Louw and Wilkie[60] describe infestation of the biliary system by *Fasciola hepatica* in South Africa This trematode should be remembered in considering the pathology of liver and bile-duct conditions in the tropics In the two cases described, a live fluke of this species was found in the bile duct A course of emetine was given following operation with apparently beneficial results *Clonorchis sinensis* infection of the liver is common in China Chin[61] mentions that this infection is not uncommonly

the satisfaction expressed by many doctors following the use of emetine in treatment of advanced amœbic complications, such as amœboma of the colon—Smith and Gray [30] have seen many cases of the condition—it is surprising to note the lack of satisfaction of many eminent authorities with the use of emetine alone. Adams [66] considers that emetine should be given for three or four days to control the urgent symptoms, and following this a course of bismuth emetine iodide (3 gr in capsule form) given each night for seven days This drug causes vomiting if given in the *form of uncoated pills If no coated pills* are available and only the uncoated pills are at hand, it may be quite useful to melt some candle grease and dip the pills in it in order to coat them lightly *Yatrin 2½ per* cent. solution is given as a retention enema A course of stovarsol may be given following this If cases appear to be resistant to treatment a course of one of the tetracycline antibiotic drugs may be given, but these are not used as a routine Chloroquin in tablet form gives excellent results in extra intestinal cases, such as in liver infections

Having personally adopted the attitude that the *urgent symptoms attributed* to amœbic dysentery are really due to a bacillary infection superimposed on top of a chronic open amœbic colonic infection, a course of sulphaguanidine has been given for two days in *all* cases with urgent symptoms, even though the case is proved to have cysts present in the stool specimens After the urgent symptoms *are controlled, which are probably largely of bacillary origin, a course of bismuth* emetine iodide (3 gr) has been given for seven days Yatrin 2½ per cent solution has been given per rectum in a few cases but not used as a routine Yatrin in pill form taken by mouth may cause urticaria about the perineum in some patients Emetine injections are frequently very painful, and if bismuth emetine iodide is equally or even more efficient in the treatment of amœbiasis there seems no good reason why the patient should be inflicted with painful injections Stovarsol (1 gr twice daily) is then given for five days No obvious recurrences have been noted after this routine of sulphaguanidine, followed by a course of bismuth emetine iodide and later stovarsol This seems to be a reasonably efficient *means of dealing* with amœbic dysentery

Surgical complications are dealt with as they arise No complications have been noted in cases treated in this way as suggested Surgery should be avoided *in cases involving* the bowel unless urgent emergencies arise, acute obstruction or perforation If the emergency is not too severe, even a few days' treatment should be given if possible before surgery Following treatment many intestinal abnormalities initially thought to require surgery may clear up without operative treatment If there is any indication of a low-grade obstruction considered to be of amœbic origin, a resection should be deferred until *after a full course of* anti-amœbic treatment is given The colon in amœbic cases is often very unhealthy, being thickened and somewhat *œdematous An* [illegible] if performed is rather liable to leak If the [illegible] is in the [illegible] sigmoid colon it may be *quite difficult* to [illegible] anastomose [illegible] ends of the gut The death rate in surgery of [illegible] cases of [illegible] high—in the level of 50 per cent —and it [illegible] surgery [illegible] voided if possible No cases have [illegible] bic [illegible]

result A course of emetine was given to the patient If a large abscess of the liver on the right side bursts into the right lung and the pus enters a bronchus, enormous quantities of pus are coughed up The liver abscess is drained automatically via the bronchus Alexander,[63] dealing with a case of liver abscess rupturing into the right bronchial system, found that following the drainage of the main volume of pus from the liver abscess area there was a persistent communication between the right lower bronchus and the abscess cavity Cough remained troublesome, and to relieve this condition he performed a right-sided phrenic nerve avulsion The patient was immediately relieved by this procedure, and with the inactive diaphragm on the right side the bronchial communication closed The patient gained weight and was cured by this means The use of crushing of the phrenic nerve should be considered in such cases and this simple operative procedure may give rapid relief A phrenic nerve crush would probably suffice in most cases, allowing regeneration and renewed diaphragmatic action after six or nine months

One patient who complained of a severe cough coming on at intervals of about four months was investigated and found on doing a lipiodol bronchogram to have a bronchial fistula communicating with the subphrenic space He had ruptured a subphrenic abscess into the right lung some years earlier To crush the phrenic nerve in this case would probably have helped greatly A very high white blood-cell count is usual in cases of subphrenic abscess It is usual to find the white cell count up to 13,000 to 16,000 when the case is first seen, and this may rise to 25,000 to 30,000 per c mm There is evidence of increased liver dullness on physical examination An X-ray examination shows the raised diaphragm very easily, the X-ray photograph should be taken with the patient in the sitting up position A liver abscess should not be tapped through the chest wall This procedure is often undertaken with a view to assisting in diagnosis before a surgical opinion is sought Tapping would not be undertaken unless an abscess was suspected Tapping of a liver abscess is only permissible if undertaken in the operating theatre immediately before drainage If pus is found the abscess should be drained immediately It is safer to tap a liver abscess through the lumbocostal angle, advancing a very long needle in the upward and forward direction, than to tap it through the chest wall

Infection of the pleural cavity is a very serious complication Drainage of a liver abscess affecting the right lobe of the liver should be undertaken, approaching the abscess by the extraperitoneal route and thus avoiding the pleural cavity and the peritoneal cavity This operation can be performed by making a 4 or 5 in incision along the lower border of the twelfth rib The rib is removed subperiosteally from its bed, cutting it just beyond the transverse process of the adjacent vertebra and 1 in from its tip, the tip being left *in situ* The muscle layers are then opened by a horizontal incision from the position of the transverse process of the first lumbar vertebra to the position where the tip of the rib was cut across Leaving the rib tip acts as a safeguard against injuring the peritoneal cavity, which may be opened if the horizontal incision goes beyond the rib tip By blunt dissection the space between the liver and the under surface of the diaphragm can be entered Advancing the gloved finger upwards and slightly

the instrument is slowly withdrawn It is essential in tropical practice to have a complete sigmoidoscope set with accessory instruments, punch forceps for biopsy as well as a spoon scoop of the appropriate length, so that it can be used through the sigmoidoscope Sigmoidoscopes may have proximal or distal lighting apparatus in them The Lockhart-Mummery type of instrument has distal lighting and is most usually employed It has the disadvantage that the lamp may become soiled rather easily A Yeoman's sigmoidoscope has proximal lighting, and the lamp does not therefore get soiled It is r
suitable for each instrument Som
for distal lighting, similar to those
bulb allows more room for the passage of forceps through the instrument than is the case where a larger and more strongly built bulb is used The proximal lighting instrument has a special bulb suitable for the design It should be remembered that the position of the distal-lighting bulb corresponds to the same position on the circle of the tube as the handle, though they are at different ends of the apparatus If the handle is lowermost the bulb is also lowermost, and if the instrument is used with the handle lowermost the bulb becomes soiled very easily The obvious method of getting over this difficulty is to use the instrument with the handle uppermost This small point is very important, and although obvious is often neglected, making a sigmoidoscopic examination a source of annoyance and ill-feeling The nurse who prepares the case may be blamed for inadequate preparation of the patient, when in fact the difficulty arises more often as a result of a fault in technique of the examination If, when a biopsy specimen is about to be taken, the light fails, the instrument has to be removed and the lamp cleaned On reintroducing the instrument it may not be possible to obtain as good a view of the lesion for biopsy as was originally seen

If the electricity supply used is from the town mains, it is necessary to use a transformer with a resistance inserted in the circuit in order to cut down the current to the appropriate level and type In purchasing any of the endoscopic instruments for use in the tropics it is essential to see that the leads have bayonet fittings, not the central "plug in" pin-and socket variety The pin-and socket type is unsuitable, as in a climate of high humidity the socket gets corroded very soon and by the nature of its shape it cannot be cleaned out easily in order to procure a good contact As a junior doctor on arrival at a "one man" country station it was found that none of the optical instruments could be used, all leads were of the pin-and-socket type and badly corroded It was necessary to have the instruments returned to the factory from which they were supplied to have the fittings changed to the bayonet type

In remote country stations away from the large towns, where there is no main electricity supply, it is desirable to have a dry battery available of exactly the correct strength for the bulb which is being employed By having a good battery of this type with terminals attached, as sold for hand-lamps, the various forms of endoscope can be attached direct without any resistance the less electrical fittings and contacts the better It is usually possible to get a dry-cell battery of the correct voltage in the main town of each country, as they are sold for portable hand-lamps and wireless sets, etc A good dry battery used

ndition is described If a large painful spleen is found in a patient who has nfirmed amœbic dysentery, it should be left alone until after a full course of eatment has been given for the amœbiasis and a course of an antimalarial drug following this the spleen still remains painful a splenectomy may be considered, ch would appear to be reasonable treatment considering that a spleen is easy to sect, and by removing it the lesion would be completely removed The loss of spleen does not appear to be unduly detrimental to a patient

SIGMOIDOSCOPY AND ITS FINDINGS

Since the invention of the various types of endoscopic instruments with uminating and optical attachments, there has been a vast improvement in the andard of diagnosis of certain pathological conditions Areas not previously cessible to direct visualisation can now be seen with appropriate endoscopes, astroscopes, œsophagoscopes, bronchoscopes and cystoscopes—all are of great alue in aiding diagnosis A certain amount of training and practice is necessary order to use these instruments Students are not usually given instruction in e practical use of these instruments during their undergraduate days of training The majority of doctors going to the tropics for the first time have never used a gmoidoscope, though they may have looked through the eyepiece of some of the ndoscopic instruments In temperate climates these instruments are used usually y specialists only, in the individual fields of surgery which they may choose hey become very expert in the use of their particular instrument The gmoidoscope is required more frequently in tropical surgical practice than in urgical practice in temperate climates In temperate climates the sigmoidoscope used almost exclusively for the detection of malignant disease and polyposis the upper rectum and sigmoid area of the colon. In the tropics it is necessary o look for manifestations of amœbiasis, schistosomiasis and chronic inflammatory onditions in addition to carcinoma Rectosigmoid corrosive burning may be een in cases following the administration of an irritant native enema The ppearances noted in this condition due to minute mucous retention cysts can best e described as looking like the appearance of the inside of the upper eyelid in a evere and active case of trachoma, multiple raised jelly-like blebs are seen over he entire surface of the rectosigmoid area In the early stages, at which time a igmoidoscopic examination is usually not carried out, there is very extensive loughing with large tags of mucous membrane becoming detached These loughs are initially grey and later brown, then they become almost black before hey separate

Stricture of the rectum secondary to lymphogranuloma inguinale may be een at times The condition may be suspected in female patients with other vidence of this disease about the external genitalia A rectovaginal fistula may be seen due either to lymphogranuloma or more commonly of post-partum origin If only the lower half of the rectum requires examination for anorectal conditions t is better to use an illuminated proctoscope When a sigmoidoscope is used he entire length of the rectum and sigmoid colon can be examined, the markings on the instrument being up to 30 cm The visual examination is undertaken as

If sigmoidoscopic examination is considered necessary it should be undertaken properly It is essential to take the patient to the theatre where all apparatus and facilities are available, it is unsuitable to undertake a sigmoidoscopic examination in the wards There are three positions in which a patient may be placed for this form of examination the left lateral position with a sand bag under the buttocks the lithotomy position, and the genupectoral position There are arguments for and against each of these positions Patients tend to like the left lateral position best, feeling that they are least exposed The lithotomy position keeps the patient very steady because of the leg support This position has been used personally most frequently It is desirable to tilt the table into a slight Trendelenburg position —this facilitates the introduction of the instrument If a slight Trendelenburg lithotomy position is not assumed there may be some secretion coming away from a rectal or sigmoid lesion which soils the lamp, thus interfering with the illumination and precluding adequate visualisation This is, however, much less likely to happen if the lamp is kept in the uppermost position of the tube, as judged by the position of the handle of the apparatus It is easier to give the patient an intravenous sedative such as pethidine if the patient is lying on his back than [illegible]

dizzy, and is liable to fall over if not assisted in maintaining his position With the patient in this position secretions tend to flow away from the instrument and therefore do not tend to soil the lamp The sigmoidoscope needs to be well lubricated before being introduced It should be remembered that the direction of the anal canal is in the line between the anal orifice and going towards the umbilicus After the anal canal is passed the direction of the instrument needs to be altered, the lower rectum passing towards the sacrum Having introduced the instrument as far as the upper limit of the rectum, the introducer should be removed and replaced by the lamp and optical apparatus so that the rectum can be examined carefully first If no pathology is noted on inspection during slow withdrawal of the illuminated instrument, the lamp should be removed and the introducer again inserted into the apparatus and the instrument reintroduced past the rectum and along the sigmoid colon to the level of the descending colon The instrument can be introduced to this level if there is no obstructive lesion present By dilating the bowel with air from the bellows the walls can be stretched and the view of the surfaces is much improved The instrument is again withdrawn slowly as the examination proceeds In some instances there may be some difficulty passing the instrument through the upper part of the rectum into the sigmoid colon, if this happens it may be useful to remove the introducer, fix the bellows in position and distend the rectum with air and, under direct vision with the lamp lighted and in position, advance the instrument carefully while the bowel is dilated—undue force must not be used at any time The head of this intrument being of a blunt nature a perforation of the bowel is most unlikely to occur in a normal rectosigmoid colon, but if there is advanced pathology this may well occur and is a serious catastrophe With practice in sigmoidoscopy a fair assessment can be made of normal and abnormal mucous membrane It

about once a week for sigmoidoscopy will probably last about one year supplying a satisfactory light during that time The rubber bellows supplied with sigmoidoscopes deteriorate rapidly in tropical climates if not specially protected To prevent deterioration of the rubber the bellows should be kept in a large tin which can be tightly closed Inside this tin there should be a small container partly filled with kerosene If, after use, the bellows are properly cleaned and put away in such a tin they will last for many years, if not so treated they will not last many months This simple method of keeping any rubber apparatus in the theatre, such as catheters, stomach tubes or rectal tubes as well as bellows, is very useful This simple scheme is not commonly known to those arriving in the tropics for the first time and thus seldom used It can be recommended with advantage There should be one bellows available for replacement in the event of mishap A sigmoidoscope biopsy forceps and a gripping forceps as well as a spoon scoop should be supplied with the instrument purchased If a punch forceps for taking biopsy specimens is purchased separately it may well have a biting mechanism which is too large for the sigmoidoscope, and if this occurs it is difficult to see the area from which the tissue is to be removed, as the large size of the biting mechanism of the forceps obstructs the view It is necessary to remove a small piece of tissue only for microscopic section Before removing a biopsy specimen it is necessary to remove the optical eyepiece, replacing this by the small individual magnifying glass, so that the field of operation remains in focus while the forceps is passed The removal of tissue from rectal lesions using a sigmoidoscope and punch forceps is seldom followed by serious bleeding

Many patients complain of the great discomfort caused by a sigmoidoscopy previously carried out If this happens it means that the patient in most cases was given inadequate sedatives before the examination was undertaken Patients may feel nervous, fearing that a sigmoidoscopic examination being recommended implies that a dangerous condition is necessarily present Half a grain of phenobarbitone given the night before the examination is carried out is a great help A general anæsthetic is seldom necessary for sigmoidoscopic examination, but it may be required in cases of acute dysentery The use of 100 mg intravenous pethidine given just before the examination is a most satisfactory sedative The patient goes into a very sleepy state, but can remain quite co-operative Pethidine does not depress respiration unduly The use of intravenous pethidine is also sufficient to reduce the discomfort of a rectal biopsy—without adequate sedation a biopsy may be very uncomfortable It is essential to have the lower bowel quite clean before sigmoidoscopy is undertaken special preparation is needed for this purpose The following method of preparation is suggested as suitable the patient should be off solid food for eighteen hours before the examination, water, tea or fruit juice can be given up to the night before examination A strong saline aperient should be given at 12 noon and an enema followed by a colon wash-out should be given at 9 P M One dose of bismuth salicylate (20 gr) at night and a further similar dose in the morning helps to dry up the colon An enema or rectal wash-out should not be given on the morning of the examination, otherwise fluid is very liable to enter the field of examination

with schistosomiasis The condition gives the appearance of an inflammatory lesion rather than a neoplastic one The small ulcers present in schistosomiasis of the rectum have a rather raised looking appearance due to the slightly pouting character of the edges Gross pathological changes in the rectosigmoid area due to schistosomiasis do not appear to be common in West Africa, slight changes may be seen but these are not very marked usually No cases of stricture of the sigmoid or rectum due to schistosomiasis have been noted personally In the case of amœbic ulceration of the rectum, not amounting to amœboma formation, small ulcers associated with the condition may show an appearance of greyness of the surface of the ulcer The ulcers look very like the small ulcers often seen inside a mouth on the inner side of the lower lip or on the tip of the tongue, said to be more common in patients with dyspepsia The ulcers may be large or quite small but look as though they would be painful, as indeed they seem to be With a carcinoma of the rectum there is usually a fairly abrupt transition between the malignant area and the normal mucous membrane, giving the appearance of an advancing edge which is raised This marked raising of the edge does not occur in amœboma The five features about an amœboma which distinguish it from a carcinoma are

1 The purplish grey looking appearance of the surface
2 The lack of sharpness between the ulcerated and the normal mucous membrane
3 Beyond the main ulcerated mass there are usually smaller ulcers
4 An amœboma discharges much more mucus than a carcinoma
5 An amœboma is more painful than a carcinoma

The mucus discharge from an amœboma usually contains many vegetative amœbæ

If a patient has symptoms suggestive of a chronic amœbiasis a scraping of the surface of the rectum should be taken and amœbæ looked for even though the surface may look normal Specimens of mucus removed should be examined within fifteen minutes in order to find active amœbæ Gelfand and Ross,[87] working in Rhodesia, carried out most thorough and extensive examinations on patients with schistosomiasis and found at post-mortem examination that in patients with schistosomiasis the rectum was affected in 75 per cent of the cases It seems that only a small proportion of schistosomiasis patients show changes in the rectal mucous membrane on sigmoidoscopic examination

Having no personal experience of *S japonicum* cases, reference has been made to three excellent articles in the *Chinese Medical Journal* which illustrate the findings of those who are very familiar with the disease P'an Ju-Sun,[88] describing the recto-sigmoidoscopic appearances of *S japonicum*, indicates that "pale yellow spots" and nodules on the mucous membrane are very characteristic of this condition Red nodules with small yellow tips are also seen, there may be yellow spots or nodules without ulceration Polypoid patches between ulcers may be noted ulcers only are noted in some cases Comparing these appearances with the changes seen in amœbic ulceration, the following points are made Amœbic ulcers are usually of variable size, have more undercut edges which tend to be

should be made a working rule that pathological conditions should not be diagnosed unless the appearances are quite definite The three main essentials to look for in the pathology of the rectum and sigmoid in the tropics are manifestations of amœbiasis, schistosomiasis and carcinoma Benign polypoid growths are not so common in tropical countries in the local people as in patients in temperate climates

Rare pathology may occasionally be encountered, such as a rectovesical fistula with water entering the rectum through a small opening A foreign body may occasionally be detected a fish bone has been noted on one occasion, there may be marked inflammatory changes about it, making it quite difficult to appreciate what is being looked at If such a condition is kept in mind it is not likely to be either overlooked or mistaken A large fish bone in the upper rectum looks extremely like a piece of glass stuck in the mucous membrane Threadworms on the surface of rectal mucous membrane are seen at times The frequency with which the various forms of schistosomiasis are found depends on the country where the doctor is working *Schistosoma japonicum* seems to be limited exclusively to the Far East In Africa *S hæmatobium* and *S mansoni* are about equally commonly present in the rectum *S hæmatobium* is much more common in the bladder in both male and female patients Most of the cases of *S mansoni* affecting the bladder are in female patients

Carcinoma of the rectum seems to be slightly less common in tropical countries than in temperate areas, though it is quite frequently seen Amœboma of the lower bowel is almost exclusively limited to residents of tropical countries Diverticulitis may give rise to a marked inflammatory condition of the sigmoid colon A low-grade obstruction is produced by this condition due to the associated inflammation in a narrow area of the large intestine With diverticulitis it may be quite difficult to pass the instrument through the sigmoid colon In schistosomiasis there are usually irregular patches of inflammation but no evidence of growth All three conditions — carcinoma, schistosomiasis and amœboma occur predominantly in the rectosigmoid area Almost three-quarters of all the cases of all three conditions occur in this area Not only should spoon scrapings be taken from the surface of the lesions present but also a biopsy specimen should be removed for microscopic examination

Comparing amœboma of the rectum and schistosomiasis of the same area, amœboma seems to give rise to a much more extensive ulceration with a lot of mucous discharge and marked discoloration of a rather purplish grey shade, beyond the edge of the major ulcerated area there may be multiple small ulcers present In carcinoma cases affecting the rectum there is much less mucus present on the surface than in cases of amœboma If a patient has not been given a general anæsthetic it is obvious that an amœboma is a very painful condition—much more so than a carcinoma, which is often almost completely painless unless the anal canal is involved

In schistosome lesions there are very frequently multiple very small ulcers associated with a yellowish patchy appearance of the surface, there is a generalised thickened appearance of the mucous membrane and it is of a brighter red colour than normal Minute yellow spots are also commonly seen in bladders affected

of rectum and sigmoid areas with some lack of the *mucosal pattern* No cases of stricture of the rectum or sigmoid colon have been noted due to acute bacillary dysentery If rectal ulceration is noted with generalised hyperæmia present, suggestive of bacillary dysentery, the case is frequently found to be one of amœbic origin with a superadded bacillary infection giving rise to acute symptoms

In attempting to undertake a sigmoidoscopic examination it may be found that the instrument may not enter the upper rectum because of stricture formation Some strictures of the rectum in female patients are due to lymphogranuloma inguinale The condition is usually not difficult to diagnose as there are usually other obvious indications of the condition affecting the external genitalia, there is sometimes a rectovaginal fistula present due to this condition It is seldom necessary to use a sigmoidoscope to diagnose the condition

Whereas sigmoidoscopy is usually used for purposes of examination and diagnosis by operative biopsy, the instrument may with great advantage be used for the deflation of a sigmoid volvulus Many cases of volvulus have been treated with success by deflation, using a sigmoidoscope and insertion of a large-bore rubber tube into the distended bowel loop From personal experience it has been *found that in-patients treated in the tropics by this method show that a high* proportion of successes can be obtained if the cases are seen on the first or second day after the onset of the condition If the cases are so treated on the third or fourth day success is very limited Success may be expected in 90 per cent of cases seen on the first day, 75 per cent on the second day, 30 per cent on the *third day, on the fourth day "very few" of the cases, on the fifth—nil* By the fifth day a patient with a volvulus of the sigmoid colon is usually moribund, if not operated upon before that time Some volvulus cases are admitted to hospital on the fifth day when they are moribund Patients relieved by sigmoidoscopy and intubation often remain quite well following the procedure The condition is, however, liable to recur and does so in about 25 per cent. of the cases if a sigmoid resection is not carried out later as a timed procedure If the volvulus is relieved by sigmoidoscopy and intubation a timed resection should be advised The operation should be performed when the patient has been adequately prepared and is in better condition A resection should not be undertaken at the time of relief of the volvulus whether this be by conservative sigmoidoscopic means or by open operation The passage of a long rubber tube through a sigmoidoscope is not likely to damage the bowel if used on the first or second day after the patient develops the condition *The procedure is not without danger if undertaken* on the third or fourth day On one occasion a house surgeon passed a rubber tube under instruction and the gut was perforated inadvertently The accident under the circumstances was my responsibility An immediate operation was undertaken The volvulus was untwisted, the perforation sutured and the *soiling of the peritoneum cleaned* The patient fortunately made an uneventful recovery—he might well have been less fortunate A gut perforation of this nature occurring during sigmoidoscopy is a very serious accident, if the rubber tube is very well lubricated such an accident is less likely to happen

indented, there is a rather greyish base and there is usually normal-looking mucous membrane between the ulcers

Almost all cases of polyposis in China are associated with *S japonicum* Non-schistosome polyposis is extremely rare in China Ling, Cheng and Chung,[69] writing on the same subject, noted that stool specimens were positive for *S japonicum* in about 85 per cent of the cases Rectal biopsy did not reveal a very high percentage of positive cases, only 11 per cent being detected as containing the ova Although the percentage of positive findings with rectal biopsy was not very high, the examination was carried out as a routine It is of interest to note that in cases where laparotomy was undertaken, biopsy on portions of the appendices epiploicæ were found to contain *S japonicum* ova in 5 5 per cent of the cases Ch'en Ming-Chai and Ch'en Chan-Chu [31] noted that many cases found to have schistosome ova present in stool specimens ultimately developed a low-grade intestinal obstruction simulating a carcinoma He found that in forty positive *S japonicum* obstruction cases there was carcinoma present in addition in fourteen of the cases

In examining the large bowel by sigmoidoscope it must be remembered that changes due to schistosomiasis may exist in a case where carcinoma is also present In view of the recognised relationship between schistosomiasis of the bladder and vesical carcinoma it is not to be wondered at that schistosomiasis of the bowel and carcinoma of the large bowel may be found in the same case in some instances *S japonicum* may cause a stricture of the rectum Perforation of the sigmoid colon may occur also in cases of *S japonicum* The rectosigmoid area is affected in three out of four of the cases of schistosomiasis of the *S japonicum* type Few cases of the condition are seen in the proximal colon The rate of growth of a mass in the bowel due to this condition is slow, taking anything from one to fifteen years to produce obstruction A palpable mass giving rise to partial obstruction can usually be confirmed by X-ray examination Obstruction due to *S japonicum* should not be diagnosed unless the ova are found in the stool though the condition may be suspected In the absence of ova in the stool specimens a biopsy should be taken from the rectal mucous membrane through a sigmoidoscope

If a sigmoidoscopic examination is to be carried out on a patient with an acute bacillary dysentery, it is desirable to give a spinal or a general anæsthetic Sigmoidoscopic examination is not often carried out for this condition The patients have marked rectal discomfort and will usually not permit the passage of the instrument under sedatives alone There is invariably a generalised hyperæmia of the rectal mucous membrane over all surfaces seen Irregular membranous-looking patches of a grey-yellow colour can usually be seen Sloughing of the surfaces is noted only in very severe cases Biggam [70] lays emphasis on the difficulty of dilating the rectum with air pressure in cases of bacillary dysentery due to thickening and œdema of the wall of the rectum He noted cases where bacillary and amœbic infections coexisted The condition clears up quickly with the use of sulphaguanidine or sulfasuxidine, tetracycline antibiotics are also very successful in treatment If the case has already passed the hyperæmic acute stage and become chronic without treatment before being seen, there is usually a rather unhealthy greyness about the mucous membrane

The number of languages present in any district and the frequent moving of doctors from station to station are two great disadvantages with which one has constantly to contend The severe epigastric pain descending to the right iliac fossa associated with vomiting and muscle guarding and marked tenderness are considered typical of appendicitis The patient's temperature is usually about 99° or 100° F Vomiting is almost invariably seen in patients in Europe There is an increase in the pulse-rate which is usually progressive if localised peritonitis develops On rectal examination tenderness is marked in about 50 per cent of the cases in Europe This picture of appendicitis is not commonly seen in indigenous patients in the tropics Pain tends to develop much more frequently at the umbilicus initially, there is commonly no vomiting at all, though nausea is usually present The pain is less well localised to the position of the appendix After eight or twelve hours the pain tends to be right across the lower abdomen though slightly marked on the right side Localised tenderness per rectum is much less commonly detected The patient's temperature tends to be higher—100° to 101° F much more frequently than 99° F The general picture seems to be more like that seen on the third day of the condition in European patients, in actual fact the indigenous patients may be suffering from appendicitis of three days' duration though the history is given that the pain started "yesterday"

In patients seen in institutions the symptoms are more like those seen in Europe The patients are probably compelled to come to hospital at an earlier stage by their superiors, who realise they are not well The standard teaching that acute appendicitis should be operated upon if seen within the first forty hours following onset remains valid in surgical practice in the tropics After forty hours local peritonitis often develops and the appendix may rupture in a high proportion of the cases At this time the symptoms become less marked and within another twelve hours there may be an obvious localised mass commencing to form If cases are operated upon at this time under the impression that the patient has been ill for only twenty-four hours, the conclusion is drawn that there is very advanced pathology in proportion to the duration of the illness In actual fact, in most cases the history is not correct In these circumstances patients are usually admitted at a time when, if the correct history were known or given, they would be treated conservatively, using antibiotics and sulpha drugs, only fluid diet being given and the patient kept in the propped up position in bed With conservative treatment the condition may settle, in some cases a local abscess forms Realising the situation after some years of experience it is obvious that a much smaller proportion of the cases suffering from appendicitis, as seen on arrival at hospital in the tropics, should be operated upon immediately than those seen in temperate climates Tropical patients usually, by their late arrival at hospital, drift into the class where conservative treatment is more suitable, they having missed the most suitable opportunity for operative treatment within the first forty hours If patients arrive and are operated upon on the third, fourth or fifth day, there is a relatively high mortality rate Falconer,[25] commenting on the seriousness of developed peritonitis, suggests that if peritonitis is confirmed it is wiser not to operate on the patient, as the prognosis is definitely bad, the presence of a mass in the right iliac fossa is quite sufficient to warrant not operating on the patient immediately

APPENDICITIS IN THE TROPICS

Appendicitis, both acute and chronic, occurs in the local residents of tropical ountries Acute appendicitis is seen less commonly in the indigenous people han in those entering the tropics from temperate areas The reason for this seems o be dietetic in origin, a high protein diet and constipation are factors which are losely associated with the occurrence of appendicitis In all parts of the world rotein food is relatively expensive The various forms of carbohydrate food are ess expensive than protein foods Acute appendicitis is a disease occurring with ncreasing frequency in proportion to the improved economic position of members f the community Appendicitis is seen more commonly in the larger towns of he tropics than in country places The economic position of the people in the arge towns is, on the average, much better than that of the country village lwellers Meat is more easily available for purchase in the towns There is a ery small amount of vegetable foodstuffs grown in the towns in proportion to the equirements Imported meat and fish preparations are purchased freely in the owns, in spite of their high price Appendicitis is becoming increasingly common n the school children of the large towns In any part of the world appendicitis ffects the adolescent age group of the community more than the older people n boarding educational institutions appendicitis is seen to the extent of about ,o per cent of that seen in a comparable group in temperate climates In remote ountry villages where meat is scarce and the people are entirely dependent on the egetable food which they grow, appendicitis is definitely rare The doctors vorking in small country stations all agree that they see only two or three ases of appendicitis in a year Those doctors working in hospitals in the arge towns see between twenty and forty cases of appendicitis in a year The ize of the population, of course, influences these figures, but it would be air to say that appendicitis is at least ten times more common in the towns han in the country parts far away from the large towns The fact that hospital services are more accessible to patients in the town may account to a mall extent for the discrepancies

The symptoms which are characteristic of acute appendicitis, as seen in Europe nd North America, are much more clear-cut and definite than those seen in the ndigenous people of tropical places It is conspicuous how freely European atients vomit when they are ill by comparison with patients born in the tropics vho very seldom vomit Many patients in the tropics with appendicitis do not omit at all though they usually have a sense of nausea There may be a marked liscrepancy between the signs and symptoms of appendicitis as seen in the local eople in the tropics and the extent of the pathology seen at operation The easons for this are that patients do not like to admit the number of days they ave been ill at home before coming to hospital They often say they have been ll one day only when they have in fact been ill for three days This gives a false mpression The lack of precision in describing symptoms may also cause lifficulty The use of an interpreter may be a necessity, but it has disadvantages n some respects, the interpretation being often very inaccurate The history an be elicited much more accurately if the doctor knows the local language

almost invariably noted that the appendix having been removed was found to be apparently normal In these cases resembling chronic appendicitis a urinary diastase test should be undertaken with a view to excluding pancreatitis If a patient in the tropics is admitted with severe abdominal pain, but in addition a severe headache, his blood should be examined for malaria parasites If parasites are found it is necessary to watch the pulse-rate very carefully during the next eight hours, as the patient may have appendicitis and malaria parasites at the same time If the pulse-rate does not continue to rise but tends to settle down after eight hours in cases where there are parasites present in the peripheral blood, it is better not to operate on the case If the patient's pulse continues to rise after eight hours or at the maximum twelve hours it may be better to operate, neglecting the parasites present Almost invariably, if the headache and abdominal symptoms are due to malaria the pulse-rate comes down within eight to twelve hours, but it is necessary to keep the patient under close observation while treating the malaria If the patient is not vomiting, mepacrine can be given by mouth Mepacrine injection is rather liable to precipitate abscess formation

Appendicitis and right-sided salpingitis in female patients may give rise to symptoms which are rather similar Acute salpingitis is more common in tropical countries than temperate climates and is much more common on the left side than the right This is thought to be due to the common tendency to the formation of a left-sided varicocele of the ovary so often seen The slight chronic congestion on the left side predisposes to the greater frequency of salpingitis on that side In female patients with right-sided lower abdominal pain the possibility of right-sided salpingitis must be considered Salpingitis is more common in women in the tropics than is appendicitis In comparing the charts of patients with appendicitis with those suffering from salpingitis it is quite obvious that the character of the pulse-rate is different in the two conditions This observation is most important With appendicitis the pulse-rate rises progressively as inflammation spreads and peritonitis develops, or it may settle down quickly to normal, as the condition improves In Fallopian-tube infections, however, the pulse-rate rises almost invariably to the level of 112 beats per minute and remains at this level constantly until the condition is adequately treated The "plateau" type of pulse rate in salpingitis is very characteristic of the condition Salpingitis is eminently suitable for treatment with penicillin, sedatives and sulpha drugs, operation is never indicated in acute cases A proportion of these cases are of gonorrhœal origin, though not all

Renal and ureteric calculus are commonly seen in some communities and very seldom in others The condition is very rare in African patients, no case having been seen in an African patient for over twenty years Ureteric calculus is seen not at all infrequently in European patients and those of the Middle East as well as in those from North-west India Bladder stones may be seen in African patients, but these are almost invariably secondary to infected bladders and probably form in the lower urinary tract exclusively Fain and Falaise [2] noted a large number of young male subjects in North-east Belgian Congo with vesical calculus They were of the opinion that the condition was associated with a deficiency of vitamin A

Several days or a week later an abscess may be obvious, this will require drainage It is usually wise not to attempt removal of the appendix at this stage for fear of spreading the inflammatory exudate to uninfected areas Patients in the tropics in spite of their illness frequently want to take food Deprivation of food appears to be a much greater hardship to those patients whose normal diet is of a large bulk and low protein value than to patients who eat smaller quantities but of a higher protein content, as seen in European patients

In the tropics there is a large number of conditions which may give rise to symptoms suggestive of appendicitis, many of these conditions have already been discussed in other sections The epigastric pain and vomiting associated with ascariasis in children and young adults may frequently give rise to a false *impression of appendicitis In most cases of ascariasis the vomiting has gone on* for a considerable time, and in spite of this the patient is not apparently very ill There is no evidence of peritonitis An ascaris perforation of the ileum with a

[illegible]

a careful history is given it can usually be found that the pain was initially very sharp and was located to the left of the umbilicus With appendicitis it is almost invariably just above the umbilicus in the middle line In the case where there has been intermittent vomiting for some weeks, a barium X-ray examination may be helpful Ascaris worms can frequently be seen outlined by the negative barium shadow Fig 12 illustrates such a case No cases of ascaris worm entering the appendix have been seen In most cases of appendicitis the appendix does not fill with barium during X-ray examination Radiology is not very helpful in appendicitis If a patient has symptoms suggestive of chronic appendicitis, a barium X-ray may be undertaken If an appendix fills with barium and empties again the patient almost certainly has not got appendicitis In most

[illegible]

After the first eight hours the picture is much less clean, depending on the secondary changes which occur Persistent midline pain, anorexia and nausea are very characteristic, and a relatively low temperature with a rising pulse are most important It is of interest to note that he commented on the presence of nausea but did not mention vomiting as a prominent feature This is in keeping with the findings in other tropical areas

Low-grade chronic pancreatitis is a condition not uncommonly seen in young *adult male patients in the tropics It* is much more common with them than in patients of the same age group in temperate climates It has not been noted in any African female patients These patients almost invariably complain of epigastric pain of an intermittent type and may even say that the pain goes to the right iliac fossa, under the circumstances it is not to be wondered at that the appendix is removed in view of this history On looking back at the charts of patients who have been subsequently found to have chronic pancreatitis it is

deal with If an abdominal wound is inflicted late in the woman's pregnancy it may be detrimental to normal delivery

In many tropical areas where hospital services are limited the question may arise as to the advisability of Government officials, traders or missionaries who have symptoms suggestive of chronic appendicitis going to remote parts on transfer It is very unwise for such patients to be away from medical and surgical facilities Removal of the appendix should be advised before the patient proceeds to a remote station If an acute inflammatory appendicular attack comes on during the rainy season bush stations are frequently completely isolated for several weeks



Fig 31
Two girls aged 12 years both with a malignant right ovary removed.

due to impassable roads, broken bridges or, for a shorter time, by fallen trees in forest country

Menez,[1] speaking of appendicitis in the Philippine Islands, comments on the tendency to adopt conservative measures in this condition He agrees that early operation is the safest rule if cases are seen within the first forty-eight hours after onset If a patient comes late or refuses operation contrary to advice, conservative measures must be adopted In treating twelve patients conservatively it was noted that all recovered The reasons for refusing operation were given as "Not too sick," in five cases, "Afraid of operation," in five cases In two cases the patients were afraid they would be "involved in expenses" which they could ill afford Treatment by bed rest, propping up and the administration of sedatives, and a course of streptomycin and sulpha drugs, and fluid diet, gave very satisfactory results *It is most unwise to rush to operative measures in all cases* In tropical practice a much smaller proportion of the cases of appendicitis are suitable for early operation than is seen in Europe Streptomycin seems to be the best antibiotic drug for treatment of appendicitis used so far

Appendicectomy can be undertaken under general, spinal or local anæsthesia Many country patients in the tropics like spinal anæsthesia best The majority

it is of vitamin origin one might reasonably expect renal and ureteric calculus to be seen in addition to vesical calculus

The threadworms so frequently seen in the appendix of patients in Europe suffering from appendicular colic are much less frequently encountered in patients in the tropics, though threadworms in the colon may be quite common

Amœbiasis of the cæcal area may give rise to symptoms suggestive of appendicitis though no such cases have been noted personally

Schistosoma hæmatobium ova are not infrequently found within the appendix in cases of thickened appendicitis of a low-grade chronic inflammatory type Schistosomiasis is more common in the country parts away from the large towns Appendicitis is more common in the towns Cases of chronic appendicitis, however, do occur associated with schistosomiasis It seems that chronic appendicitis associated with schistosomiasis is less commonly seen in West Africa than is indicated from the reports derived from East Africa Schistosomiasis cannot be detected if the appendix is not sectioned, and in many cases this examination is neglected Schistosomiasis is rare in India and is most unlikely to be a cause of chronic appendicitis in that country A small area has been discovered in the state of Bombay where there is quite a high infestation rate with schistosomiasis, but the area is well localised Considering that appendicitis may be associated with so many conditions which can be detected by laboratory examination of blood, urine and stools, the technical assistance of this section of the hospital service should be sought for appropriate assistance in other respects than for blood counts in appendicitis In cases of chronic appendicitis, underlying conditions should be looked for such as malaria, ascariasis, threadworm, schistosomiasis, amœbiasis and sickle cell disease If it is found on examination that thickening of the cæcum is present a sigmoidoscopy may be advisable with a view to looking for amœbiasis or schistosomiasis In cases of acute appendicitis a sigmoidoscopy is not indicated Many less frequently seen conditions may give rise to lower abdominal pain and cause confusion in diagnosis In the case of female patients, abnormalities of the tubes and ovaries should be looked for

Malignant tumours of the ovaries are not at all uncommon in young girls in the tropics Evans [3] reports a case of carcinoma of the ovary in a young female patient aged only 9 years This tumour gave rise to an acute abdominal attack which was suggestive of appendicitis Several cases of this nature have been encountered On one occasion two young girls (Fig 31) were in the ward at the same time, both with a malignant tumour of the ovary on the right side They both had symptoms suggestive of appendicitis, but the tumour was detected on examination

An early pregnancy associated with vomiting and lower abdominal pain may give rise to some difficulty in diagnosis but the nature of the condition can usually be determined by bimanual examination of the pelvis If a patient has one Fallopian tube chronically diseased and then becomes pregnant, such symptoms may be produced If a female patient is several months pregnant and then develops appendicitis, it is advisable always to remove the appendix Appendicectomy seldom upsets a pregnancy If the condition is neglected and a recurrence of the attack comes late in the course of the pregnancy the case may be very difficult to

deal with If an abdominal wound is inflicted late in the woman's pregnancy it may be detrimental to normal delivery

In many tropical areas where hospital services are limited the question may arise as to the advisability of Government officials, traders or missionaries who have symptoms suggestive of chronic appendicitis going to remote parts on transfer It is very unwise for such patients to be away from medical and surgical facilities Removal of the appendix should be advised before the patient proceeds to a remote station If an acute inflammatory appendicular attack comes on during the rainy season bush stations are frequently completely isolated for several weeks



FIG 31
Two girls aged 12 years both with a malignant right ovary removed

due to impassable roads, broken bridges or, for a shorter time, by fallen trees in forest country

Menez,[74] speaking of appendicitis in the Philippine Islands, comments on the tendency to adopt conservative measures in this condition He agrees that early operation is the safest rule if cases are seen within the first forty-eight hours after onset If a patient comes late or refuses operation contrary to advice, conservative measures must be adopted In treating twelve patients conservatively it was noted that all recovered The reasons for refusing operation were given as 'Not too sick," in five cases, "Afraid of operation," in five cases In two cases the patients were afraid they would be 'involved in expenses" which they could ill afford Treatment by bed rest, propping up and the administration of sedatives, and a course of streptomycin and sulpha drugs, and fluid diet, gave very satisfactory results It is most unwise to rush to operative measures in all cases In tropical practice a much smaller proportion of the cases of appendicitis are suitable for early operation than is seen in Europe Streptomycin seems to be the best antibiotic drug for treatment of appendicitis used so far

Appendicectomy can be undertaken under general, spinal or local anæsthesia Many country patients in the tropics like spinal anæsthesia best The majority

of educated persons tend to like general anæsthesia, being more confident in surgical procedures Few patients would choose local anæsthesia for abdominal surgery The procedure, however, is very satisfactory if adequate time and patience is given to the technique, and it is quite remarkable how well the patients are following operation It is very suitable for very ill patients, especially where skilled anæsthetic help is not available, as is often the case in the tropics It is essential in using local anæsthesia to use adequate sedation before the operation is started Guzman, [5] writing on painless appendicectomy under local anæsthesia, recommends that the patient should be given 1½ gr phenobarbitone the night before operation for an adult On the morning of operation, one hour before the procedure, 1½ gr seconal, and half an hour before operation ¼ gr morphia is given The relaxation with this routine and the use of ½ per cent procaine solution is adequate and satisfactory The time factor is sometimes the serious trouble in work in the tropics where there is an enormous amount of work to be done with little assistance In using local anæsthetics it must be remembered that it is essential to use large quantities of a weak anæsthetic solution rather than small quantities of a strong solution

The site and size of an abdominal incision should be so planned as to give adequate access to any condition which may be encountered If doubt exists as to the diagnosis a compromise may have to be arrived at It is always embarrassing to have to make a second incision to deal with the condition present if the initial incision is found to be unsuitable If, in the case of a suspected appendicitis, there is any possibility of the case being one of perforated duodenal ulcer, it is advisable to use a right paramedian incision placed rather higher than would normally be used for the removal of an appendix This incision tends to form a rather ugly keloid scar and should not be used as a routine procedure The cæcum in African patients is, in many cases, at a higher level than is usual in European patients The standard McBurney incision at the junction of the middle and outer third of a line drawn from the umbilicus to the antero-superior iliac spine on the right side is lower than is desirable It is more satisfactory to place the incision with two thirds above McBurney's point and one-third below rather than the reverse, which is the usual practice With the slightly higher incision some of the fleshy tissue of the external muscle has to be divided, but this is not a disadvantage if hæmostasis is attended to carefully Pelvic appendicitis is rather rare in African patients though it occasionally occurs

In lightly built young patients it is quite suitable to use a Rutherford-Morrison type of incision close to the antero-superior iliac spine This incision needs to be about 2½ in in length It is suitable in cases of appendicular colic where there is no gross inflammatory change present Many adult female patients in the tropics are very stoutly built and there is much fat on the lower abdominal wall In such cases, in patients who are liable to keloid formation, an incision placed along the Langer's line at the position of the fold of fat is eminently suitable The incision may extend from a position close to the right antero-superior iliac spine to close to the middle line This incision forms practically no keloid tissue in healing, such an incision is shown in Fig 16 It gives very good exposure to the appendix and also the pelvic organs, and is thus very useful in female patients If

in a difficult case a fuller exposure is required, the rectus abdominis muscle can be cut across completely. To do this does not give rise to subsequent disability if the muscle is approximated with its sheath on completion of the intra abdominal operation. Many doctors are rather hesitant to cut the rectus muscle across, but this can be undertaken with advantage and without detriment to the patient.

Chen and Hsiao,[8] working in China, analysed 200 cases of appendicitis. They found acute appendicitis in 62 per cent, acute and ruptured cases in 21 per cent, appendix abscess in 9 per cent. In 8 per cent of the cases an interval appendicectomy was undertaken. The fatality rate in this series was only 2 per cent, which is remarkably good. A mortality rate of 5 per cent or below is very good for areas where patients tend to report very late in the course of an illness. In less advanced areas there is also, in many cases, marked malnutrition which militates against rapid recovery.

Patients are still arriving at hospital with advanced peritonitis and paralytic ileus already present when first seen. The paralytic ileus seen on arrival is usually due in part to the inflammatory state of the appendix with its associated peritonitis, but there may be an aggravation of the condition due to the effect of an irritant native enema given at home before coming to hospital. There is little difficulty in dealing with an early case of appendicitis, such cases almost invariably do well. Late cases undoubtedly should be treated conservatively. The results of treatment by conservative measures in late cases are much better than if operation is undertaken. In some cases there may be difficulty in differentiating between appendicitis and pneumococcal peritonitis. In pneumococcal peritonitis there is usually a lot of vomiting, unlike appendicitis cases where there is frequently none or very little. In a doubtful case the technique of aspirating a drop of peritoneal fluid from the abdominal cavity with the patient in the genupectoral position and the needle inserted close to the umbilicus may be of great value. It has already been mentioned as a means of investigation in abdominal cases. If the fluid contains mixed organisms it can be concluded without doubt that a perforation of the intestinal tract of some sort is present. If the drop of fluid contains a pure culture of pneumococci, as seen on staining and microscopic examination, the diagnosis is again obvious. Pneumococcal peritonitis is better treated conservatively, using very large doses of penicillin as well as intravenous sulpha drugs. Pneumococcal peritonitis is a very serious condition; it is not benefited by early operation, at a late stage a localised abscess may have to be opened and drained.

An abdominal sickle cell crisis may give rise to urgent abdominal symptoms [illegible] be considered in the case of African children and young adults. The

[illegible]

one, and an abscess forms, the abscess may not [illegible] position of the lumbar triangle of Petit. The abscess is noted between the crest of the ileum, the outer edge of the latissimus dorsi muscle and the posterior edge of the external oblique muscle of the abdominal wall. This complication seen in patients with a cæcum placed rather high in position has been seen much more commonly in the tropics than in Europe. The condition may not initially be

educated persons tend to like general anæsthesia, being more confident in gical procedures Few patients would choose local anæsthesia for abdominal gery The procedure, however, is very satisfactory if adequate time and [illegible] patients
where
It is
ntial in
tarted
ommend
ore operation for an adult On the morning of operation, one hour before the cedure, $1\frac{1}{2}$ gr seconal, and half an hour before operation $\frac{1}{4}$ gr morphia is en The relaxation with this routine and the use of $\frac{1}{2}$ per cent procaine solution adequate and satisfactory The time factor is sometimes the serious trouble work in the tropics where there is an enormous amount of work to be done h little assistance In using local anæsthetics it must be remembered that it is ential to use large quantities of a weak anæsthetic solution rather than small antities of a strong solution

The site and size of an abdominal incision should be so planned as to give equate access to any condition which may be encountered If doubt exists as the diagnosis a compromise may have to be arrived at It is always embarrassing have to make a second incision to deal with the condition present if the initial ision is found to be unsuitable If, in the case of a suspected appendicitis, re is any possibility of the case being one of perforated duodenal ulcer, it is visable to use a right paramedian incision placed rather higher than would rmally be used for the removal of an appendix This incision tends to form rather ugly keloid scar and should not be used as a routine procedure The cum in African patients is, in many cases, at a higher level than is usual in ropean patients The standard McBurney incision at the junction of the middle d outer third of a line drawn from the umbilicus to the antero superior iliac ine on the right side is lower than is desirable It is more satisfactory to place e incision with two thirds above McBurney's point and one-third below rather an the reverse, which is the usual practice With the slightly higher incision me of the fleshy tissue of the external muscle has to be divided, but this is not disadvantage if hæmostasis is attended to carefully Pelvic appendicitis is rather re in African patients though it occasionally occurs

In lightly built young patients it is quite suitable to use a Rutherford-Morrison pe of incision close to the antero superior iliac spine This incision needs to be out $2\frac{1}{2}$ in in length It is suitable in cases of appendicular colic where there no gross inflammatory change present Many adult female patients in the opics are very stoutly built and there is much fat on the lower abdominal wall 1 such cases, in patients who are liable to keloid formation, an incision placed ong the Langer's line at the position of the fold of fat is eminently suitable he incision may extend from a position close to the right antero-superior iliac ine to close to the middle line This incision forms practically no keloid tissue 1 healing, such an incision is shown in Fig 16 It gives very good exposure to the ppendix and also the pelvic organs, and is thus very useful in female patients If

INTESTINAL OBSTRUCTION IN THE ADULT

The two subjects which cause the greatest concern to doctors working alone in country stations are Intestinal Obstruction and Obstetrical Obstruction These are two of the most serious types of surgical emergency with which one is called upon to deal Treatment *is urgent in most cases and surgery is indicated* in a high proportion of the cases Cases may be dealt with at the station where they are first seen if the doctor is capable and willing to act and adequate equipment and staff are available The doctor must decide whether he can deal with the case or must send it to a larger station where there are better facilities for dealing with the particular type of condition All country stations should be equipped with the basic minimum of apparatus to deal with the urgent surgical emergencies Whether a patient is transferred to the main centre or not is determined by several factors the local facilities, the doctor's experience, transport available and the time factor relative to the condition from which the patient is suffering

Intestinal obstruction may be due to a very large number of causes These are divided into two main classes—mechanical and paralytic obstruction The classification is simple and useful The group to which any condition belongs may be determined fairly easily by noting the presence or absence of bowel sounds In mechanical obstruction intestinal noises can be heard on auscultation In cases of paralytic obstruction bowel sounds are absent or markedly reduced Mechanical obstruction cases almost invariably require emergency operative treatment Paralytic obstruction in most cases is better treated conservatively In a small proportion of cases there may be a mechanical obstruction which has a superadded paralytic element due to superimposed infection from the bowel or elsewhere *At an early stage of a surgical career the impression is gained that the treatment* of all cases of intestinal obstruction is essentially operative, this impression is, however, not correct In the practice of surgery in the tropics it will be found that not more than 60 per cent of the cases with some form of obstruction present require immediate operative treatment In the tropics a much higher proportion of cases are seen where the obstruction is of the inflammatory paralytic type than is usual in non-tropical areas of the world In these cases some form of active surgical treatment may be required at a slightly later time though not initially Patients suffering from intestinal obstruction in the tropics usually complain of abdominal pain and distension, vomiting is usually not very marked—much less *so than seen in patients in Europe with the same condition*

It is a good rule to spend at least five minutes in getting an accurate history before any examination is undertaken To start examining a patient immediately

The better the

ition as time will

cases some notes

should be written down at the time of examination The part a patient complains of naturally attracts most attention, but it is essential to consider the patient as a whole, keeping in mind his general physical condition—an *all-over examination* should be undertaken in all cases The patient should be adequately exposed, *otherwise* important factors may be overlooked In tropical areas, where

suspected After opening or rupture of the abscess a fæcal fistula is formed This becomes obvious after the initial pus has drained away

If a fæcal fistula is suspected a track may be demonstrated, using lipiodol and X ray examination In many country stations there is no X-ray apparatus and other means must be relied upon Much the easiest procedure in such places is to give the patient a spoonful of ground charcoal and follow this with a saline aperient, a fæcal fistula always discharges more freely following an aperient, and in almost 100 per cent of fistula cases the black specks of charcoal are seen on the dressings within twelve hours The method is simple, cheap and as efficient as X-ray examination

If a fæcal fistula occurs through the lumbar triangle of Petit it is not satisfactory to attempt to deal with the condition locally In these cases there is much inflammation present and it is advisable to undertake a right hemicolectomy, removing the appendix, the cæcum and the first third of the transverse colon, re establishment of the bowel being attained by the closure of the transverse colon and formation of an end-to side ileotransverse colostomy Appendicectomy alone is not usually satisfactory

If, following an appendicectomy, the wound breaks down and a fæcal fistula develops, some underlying pathology in the cæcum may be suspected in many cases, though not in all An interesting case was noted relative to fæcal fistula and the observations are of value A European patient suffering from acute appendicitis coming from up country to the main coast town for hospitalisation was derailed while travelling by train The patient arrived ten hours late, it then being 2 A M He proceeded to the local hotel instead of going to hospital Next morning he felt better, his appendix probably having ruptured Friends took him to their home for another twenty-four hours, during which time he drank alcohol freely He was then sent to hospital Although a late case, it was considered advisable to try and remove his appendix—a very large ruptured appendix was removed There was already a large patch of gangrene of the cæcum present After removal of the appendix the necrotic area of the cæcum was repaired and a drainage tube inserted to the local area The tube was removed on the fourth day and the patient appeared to make satisfactory progress On the sixth day he developed an acute attack of thrombosis of hæmorrhoids This painful condition associated with rectal sphincter spasm constituted a form of distal obstruction and his appendix wound broke down with the formation of a fæcal fistula On consulting the available textbooks it was learned that if a fistula is formed from the lower end of the ileum it seldom closes spontaneously, there being a slight ileocæcal obstruction beyond the site of the leak If, however, the fistula comes from the cæcum and there is no obstruction, it usually closes within four or five days if there is no further underlying pathology Fortunately in this case the hæmorrhoids improved rapidly and the fistula closed within five days To develop appendicitis and be derailed in a train on the same day is a most unfortunate coincidence It should not be forgotten that a patient suffering from peritonitis may be much improved by intravenous fluids A blood transfusion is a great advantage and should not be forgotten The obvious use of transfusion was more apparent before the antibiotic drugs were introduced

seen in newborn infants The high rate for strangulation by bands in the American series is probably accounted for by the large amount of major intra-abdominal surgery undertaken "Other causes, 25 5 per cent" seems very high for an unclassified group The various figures given afford an opportunity for speculation as to the possible reasons for the varying incidences The discrepancy in incidence of surgical conditions becomes obvious after a short residence in the tropics

Intussusception in the tropics is slightly more common in adults than in infants Burkitt,[78] comparing the incidence of acute abdominal emergencies in British and Baganda patients, found intussusception in the former almost exclusively limited to infants, while in the African patient intussusception was seen almost invariably in adults There is no doubt whatever that intussusception *in adults born in the tropics is much more commonly* seen than in adults born in temperate climates

Volvulus of various sorts is much more common in the tropics than in non-tropical areas Volvulus of the sigmoid colon is the type most commonly seen The condition is almost exclusively limited to male patients Volvulus *of the small intestine though not a common condition is seen more often in the* tropics than in Europe and more frequently in female patients It is almost invariably precipitated by a band passing between the lower ileum and the back of the umbilicus In the cases seen, the presence of a residual vitelline duct suggested itself but the adhesion on examination did not look like a developmental *structure, it was much more like an inflammatory adhesion* Millar,[9] working in Kisumu in East Africa, had the unusual experience during five years of surgical work of seeing fourteen cases of volvulus of which nine were of the small intestine, two were of the cæcum while only three were of the sigmoid colon These figures are very unusual The high incidence of small intestine volvulus is remarkable

In many instances doctors working in Africa may see as many as twelve cases of volvulus in a year In some areas volvulus seems to be rare Hoffman,[80] working in North-west Ghana, comments on the infrequency of any form of intestinal obstruction other than those due to strangulated hernia *Only* one case of intussusception was seen in three years Intestinal obstruction of all sorts appears to be more common in areas where the food supplies are good than in areas where the food supply is sparse for the needs of the people The incidence of sigmoid volvulus is much higher in areas where maize is one of the main sources of farinaceous diet *Volvulus of the cæcum or stomach is rarely seen in* West *Africa The order of frequency of cause of intestinal obstruction in the tropics* is in most places strangulated hernia at various sites, strangulation by bands, volvulus of the sigmoid colon and congenital occlusion of the gut at various sites imperforate anus being seen much more commonly in the tropics than in *temperate climates*

Intestinal obstruction by bands may be secondary to pelvic adhesions The adhesions are secondary to various inflammatory conditions of the pelvic organs In a high proportion of cases where strong adhesions are *found between the surface* [illegible] of chron c dysentery probably [illegible] ions

the weather is warm, patients do not get cold easily during the short time required for physical examination

In all cases suspected of having any form of intestinal obstruction, bowel sounds should be listened for most carefully A binaural stethoscope may be used or the ear placed directly on the patient's abdominal wall The direct method is considered far superior to the stethoscope method In looking for visible peristaltic movements of the bowel it is very helpful to use a good electric light placed on a level with the abdominal wall, slightly behind and to one side of the examining eye As with the irregularities of a road surface as shown up by the headlights of a car, so a lowly placed light on a level with the abdominal wall shows up the slight waving elevations caused by intestinal peristaltic movements

Strangulated herniæ of various sorts account for the largest number of cases of intestinal obstruction due to any single condition in all parts of the world It is obviously essential to examine all the hernial orifices very carefully under the circumstances Band obstruction due to adhesions ranks second in most places It is probably the greatest cause of intestinal obstruction in female patients Intestinal obstruction by bands is very much more common in female patients than in male patients The high incidence in female patients is attributed to localised peritonitis due to minute gut perforations by ascaris worms, which are very much more common in women than men Female patients seem to be more heavily infected by ascaris worms than male patients, why this is so is not obvious, but it seems to be the case Small perforations of the ileum become sealed off with the formation of a local patch of adhesions and these cause obstruction usually some months later In a high proportion of cases of band obstruction, where a careful history is taken, it will be found that there has usually been a severe abdominal episode of some sort about six to eight months before the obstruction occurred Some cases of band obstruction follow previous operations, this is the usual cause in Europe and North America

Volvulus of various sorts ranks much higher as a cause of intestinal obstruction in the tropics than it does in temperate climates Andersen,[77] working in India, compares the causes of intestinal obstruction, as seen in an Indian village hospital, with those noted from Massachusetts Hospital, U S A The comparative figures are of interest and represent fairly closely the findings of many doctors working in tropical areas

	India Per cent	U S A Per cent
Volvulus	20 0	4
Intussusception	1 0	5
Malignant new growth	2 0	10
Strangulated hernia	15 5	44
Strangulation by bands	22 0	30
Congenital defects	14 0	4
Other causes	25 5	3

The figure given for the Indian series relative to intussusception is lower than is usually found in West Africa The high figure for congenital defects is usual in tropical surgical practice due to the large number of cases of imperforate anus

and the patient becomes constipated, a subacute obstruction then occurs The stricture requires periodic dilatation from below

Benign tumours of the stomach and small gut give rise to colicky pains at intervals, such tumours are seen on rare occasions only The condition is usually detected only when an intussusception is precipitated by a benign small bowel growth Fig 32 shows such a condition, a piece of bowel having been resected because of an intussusception caused by the tumour within the ileum Ileocæcal intussusception has been the type most frequently encountered in African patients This is the case in both infants and adults *The apex of the intussusception in adults almost invariably reaches the first third of the transverse colon only*, no case has been seen beyond this point In infants the intussusceptum proceeds further in many cases, in some instances prolapse of the intussusceptum has been seen through the anal sphincter The intussusception of adults is usually a *subacute condition without complete* obstruction of the bowel occurring In most cases of the condition the patients do not come to hospital until symptoms have existed for from one to three weeks Because the obstruction is not complete, *flatus is usually passed and* abdominal distension is not marked and *may be absent altogether* The passage of blood-stained mucus with a small amount of fæcal matter is usual in these chronic intussusception cases With volvulus cases, on the other hand, blood-staining is not seen even if a little mucus is passed



FIG 32
Intussusception resected and found to contain a benign tumour

The presence of blood-stained mucus passed per rectum is very characteristic of intussusception In cases of intussusception in adults a mass can almost invariably be *felt to the right of the middle line at a level a little above the umbilicus* Abdominal pain is of a colicky intermittent character The patient's general condition is usually fairly good No cases of reduction by digital pressure at operation have been noted in adult intussusception, all cases seen being of many days or some weeks' duration Only in acute intussusception of short duration is manual reduction at all likely All adult cases of this condition have been treated by right hemicolectomy and anastomosis As the condition is not entirely of an emergency type, it is desirable to give the patient *a course of sulphaguanidine* for forty-eight hours before operation is undertaken All cases of this condition have done well, there have been no fatalities in spite of the magnitude of the surgical procedure

If an intussusception cannot be reduced easily there is no good forcing it Reduction of intussusception by making an incision in the intussuscipiens is very

Ascariasis is a potent cause of intestinal adhesions with subsequent small gut obstruction The adhesions are due to inflammatory changes secondary to a minute perforation which, after a limited leak of infected material, becomes sealed off Intestinal obstruction may be caused by a mass of ascaris worms within the jejunum in very heavy infections The degree of obstruction present is probably the precipitating cause of the vomiting In cases of partial obstruction due to ascariasis, treatment of the worms is a matter of some urgency, if not treated the obstruction may become complete and it may be difficult to dislodge a ball of ascaris worms It is not wise to open the gut in order to remove the worms If they cannot be dislodged by gentle digital pressure it may be safer to resect the mass complete and perform an intestinal anastomosis to re-establish the continuity of the gut Chu, Shou-Ho [81] has recently made important observations on the use of intragastric oxygen in the treatment of intestinal obstruction, due to ascaris worm masses, in children The method has been found to be eminently successful, observing a large number of cases By this means laparotomy can frequently be avoided in cases where it might otherwise be necessary due to the large mass of worms impacted

Œsophageal obstruction is seen less commonly in the tropics than in Europe If an X-ray apparatus is not available the condition can be confirmed by using an œsophagoscope An emergency bronchoscope with batteries in the handle is a most useful instrument in country stations It can be used for the trachea and the œsophagus for visual examination purposes as well as for the removal of foreign bodies, with a bronchoscope forceps

Gastric obstruction in adults is usually due to pyloric fibrosis secondary to healed gastric ulcer In some cases an active ulcer may cause the obstruction and in other instances a gastric carcinoma may be present In old cases of healed gastric ulcer which are followed by pyloric stenosis a gastro-enterostomy is a suitable operation In cases where the ulceration is still active a partial gastrectomy is the operation of choice A partial gastrectomy is also necessary in the case of carcinoma of the stomach If it is not possible to remove a carcinoma of the stomach, a gastro-enterostomy may be performed, but patients not infrequently die within a few weeks of operation although they get over the immediate surgical procedure If pyloric obstruction is suspected and no X-ray apparatus is available in country stations, visible peristalsis can be demonstrated very easily by giving the patient a Seidlitz powder, this forms a large amount of gas within the stomach and visible peristalsis can be seen very soon after ingestion of the powder This simple *and quite safe procedure may be useful at times*

In tropical areas strictures of the rectum due to lymphogranuloma inguinale may be seen not infrequently and these may cause intestinal obstruction The condition is detected easily on rectal examination but if not looked for or suspected it may not be detected A patient is not likely to give a history of this form of disease where low intestinal obstruction develops secondary to it This cause of bowel obstruction is exceptionally rare in temperate climates The patient may be admitted with symptoms and signs very suggestive of volvulus of the sigmoid colon Rectal examination should not be neglected in any case of intestinal obstruction Symptoms do not usually become acute until the stricture is advanced

air Reduction by internal pressure is likely to be successful in a limited number of early cases in infants where the procedure has a definite place in the treatment in some cases

Tuberculous peritonitis as a cause of intestinal obstruction is rare in the tropics, considering the large amount of pulmonary tuberculosis which exists in the large cities in many tropical areas Intra-abdominal adhesions may arise following any inflammatory condition Cases of appendicitis with peritonitis account for a small number of cases of intestinal obstruction Advanced cases of appendicitis are more commonly seen in the tropics than in temperate climates as cases of this condition tend to arrive at hospital after the condition has existed for two, three or more days

Typhoid fever is associated with extensive inflammatory changes within the peritoneal cavity, judging by the appearances seen in cases operated upon for typhoid perforation, it can be concluded that masses of adhesions are formed in most cases Considerable dietetic care is necessary after any inflammatory condition within the peritoneal cavity If injudicious diet is taken freely, obstructive symptoms may develop

Carcinoma, amœbiasis and schistosomiasis all give rise to intraluminar obstructive conditions Progressive obstruction is the rule with malignancy of the large bowel Carcinoma seldom occurs within the small intestine In only a small proportion of cases of amœbiasis or schistosomiasis do obstructive lesions occur With schistosomiasis the obstruction is very slowly progressive, taking many years in most cases to produce severe symptoms The clinical features and investigation of these three conditions have already been discussed and compared Surgery should be avoided if at all possible in the case of bowel symptoms due to schistosomiasis and amœbiasis, only if perforation or obstruction occurs should surgery be undertaken In the case of malignant disease, early operation is desirable and necessary

Patients should be adequately prepared before any form of colonic surgery The use of sulfasuxidine and streptomycin have greatly improved the prognosis in colon surgery Patients in the tropics do not accept colostomies willingly and usually demand that they be closed before leaving hospital To get over the colostomy difficulty the practice has been adopted, where possible, of doing a short-circuit operation between the parts of the bowel above and below the growth After this form of preliminary drainage is undertaken a resection of the tumour mass is performed at a later date Colostomies have thus been avoided and the results have been reasonably good, in spite of the fact that many of the cases dealt with were seen initially at rather a late stage If the case is inoperable, in the sense of it being not possible to remove the primary growth, the patient is at least made more comfortable by the relief of the obstruction

The subject of surgical treatment of hernia, both strangulated and non-strangulated, is sufficiently important to warrant a separate section on each condition

Volvulus of the stomach is rarely seen The condition can usually be relieved by the passage of a large-size stomach tube Operation is not usually required unless there is a recurrence of the condition Only two cases have been seen,

unwise The tissues are very œdematous, and if cut do not heal well when sutured and are very prone to infection and leakage following suture It is a good rule to note the time on the clock and not spend more than ten minutes attempting to reduce the acute type of the condition If a reduction cannot be achieved quickly and easily a resection is the best procedure, if the right side of the colon only is involved If the left side of the colon is implicated, as it may be in children of school age, it is advisable to undertake a short circuit operation joining the ileum to a point beyond the intussusceptum If the splenic flexure of the colon is involved an attempt to remove the entire mass is very dangerous and a by pass operation is advised to relieve the obstruction, the intussusception being left alone This has been undertaken on several occasions with satisfaction The rule has been evolved as a result of experience with irreducible intussusception cases—those on the right of the middle line resect complete and anastomose the ileum to the transverse colon, cases involving the left half of the transverse colon and splenic flexure perform a by pass operation and leave the intussusception alone What exactly happens to the intussusceptum is difficult to discern The mass seems to disappear completely though it has never been noted that the patient has passed anything resembling an intestinal slough



Fig 33
Barium enema appearance five years after a by pass operation

An interesting X ray (Fig 33) is included of a juvenile patient who was operated upon five years earlier using the by pass method as the splenic flexure was involved The recent X ray appearances suggest both that the anastomotic opening has remained open and that the normal channel has been filled, allowing passage of barium also There was no palpable abnormality of the abdomen at the time the X ray photograph was taken and the patient had no symptoms of any disease The patient had the photograph taken for the purpose of a demonstration at a surgical section meeting five years after his initial operation He was operated upon at the age of 5 years and was 10 years old at the time of the surgical meeting visit

Exteriorisation of an intussusception is never advocated, it is an unsatisfactory procedure if at all possible, the structures are seldom sufficiently mobile to reach the surface of the abdominal wall No cases have been seen in adults which were considered suitable for reduction by intraluminar pressure by water, barium or

anterior wall Having undertaken this procedure and had the opportunity of seeing the results some years later when a recurrence took place, it seems that to stitch an unhealthy distended large bowel to the back of the abdominal wall does not predispose to firm fixation A few adhesions only are formed, which may be more dangerous than useful It is advisable to relieve a sigmoid volvulus if possible by sigmoidoscopy and intubation The tube should be left in position for forty-eight hours A colon wash-out is given on two occasions The patient should, four weeks later, be given sulfasuxidine by mouth and a course of streptomycin as a preliminary to operative resection of the redundant sigmoid loop of colon This operation is advisable in order to ensure a permanent cure Unfortunately patients relieved of urgent symptoms by sigmoidoscopy frequently decline operation If a volvulus recurs and is relieved on a second occasion by sigmoidoscopy the patient seldom declines operation after the second attack, realising the danger of recurrence Patients who have suffered from volvulus should keep their bowels regular and free, avoiding large quantities of bulky food It is highly dangerous to attempt the removal of the sigmoid loop at the time of the emergency operation for relief of the torsion The gut is in a very unhealthy œdematous state as a result of the interference with the blood supply With adequate pre-operative preparation a one-stage sigmoid resection can be undertaken a month later with reasonable safety, there being no obstruction at the time of operation

In the case of any form of high intestinal obstruction great improvement can be obtained if nasogastric suction is employed and lost fluid and electrolytes replaced by intravenous infusion A Miller-Abbott duodenal tube may be passed with advantage In some cases it enters the duodenum, in others it does not do so In cases of incomplete band obstruction the obstruction in some cases may be relieved by the use of gastric suction alone If band obstruction is relieved by the section of the adhesion alone it is very liable to recur If the patient's condition is reasonably good it may be advisable to undertake a resection of the involved loop, with anastomosis to reconstruct the bowel It is essential to use healthy gut in the construction of the new junction

Blood counts are not usually employed in cases of intestinal obstruction, but it is of interest to note that in obstruction cases where strangulation is present a rapid leucocytosis develops The white cells may reach 15,000 to 20,000 per c mm with the onset of gangrene This form of examination may at times be helpful

On rare occasions fungoid conditions give rise to intestinal tumour formation Such tumours usually represent a local manifestation of a more widespread process Operative treatment, therefore, seldom cures the patient All bowel tumours should be sectioned to ascertain the nature of the pathology

In tropical surgical practice a high proportion of cases of intestinal obstruction are of the paralytic type, being of inflammatory origin These cases are not suitable for treatment by operative measures in most cases this is much more apparent than in temperate climates

A history of injury is seldom asked for in cases of abdominal pain or where obstruction is suspected To enquire for a history of accident may be useful

and this is insufficient experience to warrant laying down any rules in the treatment of the condition

The cæcum in African patients seems to be much more mobile than that seen in most European patients In some instances it is found to be almost completely peritonealised, and being less well fixed it may be subject to volvulus more easily The position of the cæcum also is frequently placed at a higher level than that seen in patients in temperate zones The somewhat upward angle of entry of the ileum into the cæcum is also much more in line with the cæcum than that seen in Europe This is likely to be a factor in the more frequent production of adult intussusception in the tropics The higher position of the cæcum as noted in patients in Africa may also account for the more frequent occurrence of an appendix abscess bursting through the lumbar triangle of Petit The tip of the appendix is frequently placed in a position just under the triangle of Petit when the cæcum is in the high position

Volvulus is so frequently seen in the tropics that ample experience is gained in the various methods of treatment If a volvulus of the sigmoid colon is untreated the patient usually dies on the fifth or sixth day If the case is seen early the obstruction can very frequently be relieved by a sigmoidoscope and passage of a rubber tube into the distended large gut loop By sigmoidoscopy 90 per cent of the cases can be relieved if seen on the first day If seen on the second day sigmoidoscopy is successful in about 75 per cent of the cases, and on the third day only 30 per cent are likely to be relieved by sigmoidoscope and tube On the fourth day only a few cases are successfully relieved by the method The procedure becomes dangerous after the third day as the bowel may be damaged due to its œdematous and unhealthy state Most patients suffering from volvulus in the tropics are admitted to hospital on the third day Sigmoidoscopic relief is therefore successful in about one third of the cases and is worth attempting The remaining cases require operation In some instances the patients are moribund on admission

A subumbilical midline incision is most suitable for the untwisting of a sigmoid volvulus An incision on the left side of the abdomen is less suitable and very little use if, where sigmoid volvulus is suspected but not found at operation, some other procedure has to be undertaken In very late volvulus cases where the patients are unfit for untwisting of the volvulus they may be in great distress If their poor condition precludes radical operation great relief may be obtained by puncturing the distended loop of gut with a large-size trocar and cannula and inserting a de Pezzer catheter the distension is thereby relieved and they can breathe more freely and usually sleep On wakening, their gratitude is obvious even though their condition is hopeless If it is not possible to cure the patient, it is incumbent upon the doctor to relieve him of his distress as far as possible Some traction should be applied to the catheter so that there is not a gross leak of intestinal contents into the peritoneal cavity The head of the catheter should be drawn up to the back of the anterior abdominal wall and fixed in position with one suture The operation can be undertaken using local anæsthesia

Recurrence of sigmoid volvulus following operation is noted in about 20 per cent of the cases It is of little value fixing the entwisted bowel to the back of the

On movement of the bowels blood-stained fluid contents are usually noted There is no mass palpable within the abdomen and the maximum pain is about the umbilicus There is usually marked pain about the lower part of the chest The condition may simulate a gastric or duodenal perforation The cardiac irregularity suggests the nature of the condition

Volvulus of the small intestine gives rise to symptoms very like those of mesenteric thrombosis The pulse, though weak in this case due to the shock present, is usually regular Volvulus of the small intestine is a very serious condition In the three or four cases seen the cause of the condition seemed to be a rotation round an adhesion between the small intestine and the back of the umbilicus, it was therefore in the nature of a band obstruction The appearances did not suggest a residual vitelline duct, though the position of the band was in the position one might expect to find the vitelline duct to be situated if present Many feet of the small bowel are usually involved and the prognosis is poor The patients usually arrive at hospital in a moribund condition An extensive gut resection may be successful in a small number of the cases The removal of the precipitating adhesion is usually inadequate in dealing with the condition The gut is of a dark purple colour and filled with a large quantity of hæmorrhagic exudate All the cases seen were in female patients Band obstructions are much more common in female patients than male patients

Meckel's diverticulitis gives rise to symptoms very like appendicitis and a paralytic obstruction occurs due to local peritonitis with abscess formation Drainage of the abscess is required in most of the cases No case has been diagnosed at the early stage of the inflammation If a fæcal fistula forms a resection may be necessary at a later stage for the removal of the condition

In cases of localised peritonitis part of the bowel becomes paralysed but other parts remain active In these cases bowel sounds can usually be heard but they are interposed by long intervals of silence, sometimes up to two minutes During these intervals no sounds at all can be heard Local mechanical obstruction with very little inflammation gives rise to very active bowel sounds Obstructive bowel sounds are loudest over the site of obstruction, this fact often gives a fair indication of the most likely cause of the condition present and may be helpful in determining the most suitable site for operative approach If inflammation is over a wide area there are usually no bowel sounds heard at all Blood within the peritoneal cavity as seen in cases of ruptured ectopic pregnancy gives rise to an inhibitory condition of the intestine There is usually some abdominal distension A few bowel sounds can be heard at infrequent intervals

Following Cæsarean section there is almost invariably some abdominal distension, but if there is no infection present the abdomen remains soft After four or five days the distension disappears If there is infection present the distension becomes very tight with distress to the patient and an elevation of the temperature

Bezoar formation is a low-grade form of incomplete intestinal obstruction associated with the accumulation of vegetable products or hair within the bowel Some consideration is given to this subject in another section

Hirschsprung's disease is a peculiar form of intestinal obstruction with special characteristics One segment of the large gut has a defective neuromuscular

on occasions An instructive case was seen by a senior colleague and operated upon in the belief that an intestinal obstruction due to an intussusception was present At operation a large mass was found in the cæcum and ascending colon, but this was not an intussusception The nature of the condition not being certain, the mass was removed complete and the bowel reconstructed On examining the specimen (Fig 34) it was found that the mass was due to a large-size submucous hæmatoma The history was elicited after the operation that the patient had had a football injury two weeks before coming into hospital A football had struck him forcibly on the abdomen

A few cases of partial obstruction simulating Crohn's regional ileitis have been observed in the tropics, but on reflecting on the possible nature of the



Fig 34
Submucous hæmatoma of cæcum following abdominal injury

condition it was considered that the pathology might have been due to schistosomiasis The tissue unfortunately was not sectioned as might have been done with advantage

Diverticulitis as a cause of partial obstruction is less common in the tropics than in temperate climates In cases suggestive of this condition, amœbiasis and schistosomiasis should be looked for Persistent pain and thickening of the sigmoid area or descending colon may be noted in any of these conditions If diverticulitis is suspected the patient should have a sigmoidoscopic examination undertaken after adequate preparation Diverticulitis usually settles down without operation

No cases of mesenteric thrombosis have been noted in indigenous patients in the tropics The condition is much more common in European patients, a small number of such cases only have been seen Sudden very severe abdominal pain with vomiting and collapse in elderly patients, associated with an irregular pulse, may suggest the condition There is usually a marked irregularity of the heart present The initial collapse requires heat, sedatives and cardiac stimulants

pressure than is normal An action is induced comparable to that exerted in the lung where unoxygenated blood under high pressure in the pulmonary system gives off its CO_2 when it reaches the pulmonary alveoli In volvulus the obstructed veins, probably under the influence of a high venous pressure, give off CO_2 in a comparable manner, the twisted loop being in a confined space dilates rapidly with the gas evolved That there is some disturbance of the circulation and a degree of large bowel inhibition resulting from the ingestion of the corn, palm wine and salts is probable, though the mechanism is not clear

Sickle cell abdominal crisis has already been mentioned as being a condition giving rise to urgent abdominal symptoms In this condition the small intestine is dilated The large gut remains contracted This has been noted where a few cases were operated upon in error before the significance of the condition was fully appreciated There has been very little written about sickle cell disease relative to surgery If in a young African adult there is marked abdominal discomfort, some abdominal distension and a severe headache associated with marked sweating and pains in the limbs, the blood should be examined for sickle cell disease This condition may mimic several surgical conditions, one of them being intestinal obstruction Fig 7 shows a small boy thought to have an intestinal obstruction He was not operated upon as his blood was found to show marked sickling On the left side of the abdomen over the spleen area there are several marks put on at home by way of treatment for a painful spleen The enlarged spleen was probably due to chronic malaria and sickle cell disease

Distension of the abdomen secondary to fracture of the spine is well known This condition is one form of a paralytic obstruction of neurogenic origin In these cases there is invariably a history of a violent accident

One unusual case was noted where an acute abdominal distension was due to rabies in a patient admitted to an antenatal ward The doctor who referred the case for an opinion had not previously seen a case of rabies, having arrived only recently in the tropics The woman's wild appearance and jerky movements associated with saliva coming from the mouth all suggested the condition which was very obvious if rabies had previously been seen Asking the patient to drink water precipitated violent jaw movements, then on asking her about a possible dog-bite she pointed to her right knee in a jerky convulsive manner The patient died of rabies the next day Such a case is no doubt very rare but is of interest

X-ray examination may be helpful in cases of intestinal obstruction A straight X-ray photograph taken with the patient in the sitting-up position shows the contour of the dilated bowel The smooth character of the small gut is characteristic while the sacculations of the large intestine can be seen very easily Fluid levels are also seen if present

External pressure on the surface of the bowel may cause partial intestinal obstruction, but this is seldom complete A fibroid of the uterus impacted in the pelvis may cause such partial obstruction A large ovarian cyst may also give rise to obstructive symptoms Such conditions are usually not difficult to detect on examination Hydatid cysts within the abdomen may give rise to pressure on the bowel Such cases have been noted in South Africa but not dealt with personally

mechanism present In this condition there are usually active bowel sounds due to activity of the part of the gut above the lesion The condition is seen most commonly in young children

Pneumococcal peritonitis is a condition which gives rise to a marked paralytic obstruction of the bowel Marked abdominal pain and distension accompanied by a high temperature coming on and associated with much vomiting are very suggestive of the condition If the diagnosis is confirmed by aspiration of a small quantity of peritoneal fluid and examination of the stained specimen for the typical organisms in pure culture, treatment should be undertaken along conservative lines The absence of bowel sounds and the distension suggests the paralytic nature of the condition Operation is not beneficial at an early stage At a later stage a local abscess may form and this will require drainage Large doses of intravenous sulpha drugs and penicillin are beneficial Pulmonary signs are seldom detectable at the stage when pneumococcal peritonitis is seen, they may occur in some of the cases later, but not necessarily in all instances

Native enemata frequently give rise to a paralytic ileus A virulent proctitis associated with pelvic peritonitis is caused by the irritant ingredients of the enema There may be sloughing of the rectal mucous membrane These cases are better not operated upon as they are paralytic in type They settle down in about a week to ten days Strong sedatives are required for the abdominal pain present The use of streptomycin as a prophylactic measure to curtail the spread of infection in the soft tissues of the rectal wall is a help There is marked pain and distension very like pneumococcal peritonitis, but in this condition vomiting is not at all common Intestinal obstruction may occur at a later stage due to the corrosive destruction of the mucous membrane of the rectum with formation of granulation tissue and later stricture formation about the upper rectal area These strictures are difficult to deal with because of the position The matter of treatment has already been considered earlier in this chapter

Cases have been seen in the tropics where patients suffered from a condition strongly suggestive of volvulus of the sigmoid colon, but on being given an enema much gas was passed per rectum with a small amount of fæcal matter After an interval of one hour a second enema was given which was followed by the passage of a further large quantity of gas and some fæcal matter The conclusion was reached that there was not a complete obstruction present, as in cases of sigmoid volvulus A further enema repeated four hours later produced the same gaseous result It was obvious that there was some factor tending to produce bowel inhibition and an abnormally large quantity of gas in the colon In almost all of these cases the history was elicited that the patient had eaten a large number of fresh corn cobs (sixteen being the number reported in one case) and followed this with the ingestion of locally made palm wine The use of fresh corn, palm wine and a dose of salts appears to precipitate this peculiar condition Its occurrence is usually seasonal, it being noted at the time of the ripening of the fresh corn crop

How the large quantity of gas is formed is of interest There is considerable evidence to suggest that gas formed in a volvulus is not due to fermentation of the contents of the obstructed loop of sigmoid colon but rather to gas given off from the veins of the intestine which are obstructed and therefore under a higher

sutures are not brought to the end of each line, so that acute angulation is avoided at the places the bowel folds back on itself By this method the small gut does not wander in irregular loose loops but stays in a compact mass of parallel lines in a more or less solid block (Fig 35)

If intestinal obstruction cases are operated upon under general anæsthetic, preliminary gastric suction should be employed This decreases the risk of

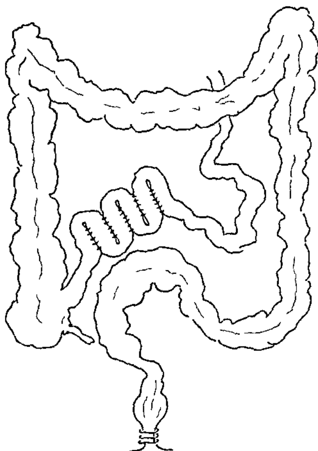


Fig 35
Small gut plication in chronic adhesion cases illustrating method

aspirating infected vomitus into the respiratory passages It is also advisable to give a general anæsthetic with an open mask, not using a closed circuit with the rubber face piece of the anæsthetic apparatus strapped on to the patient's head [illegible] n the event of the patient vomiting while [illegible] ask is strapped on it [illegible] ected gastric contents is almost inevitable If the patient goes to the theatre with a nasogastric tube in position, aspiration can be applied at intervals in order to decrease the risk of

Many patients admitted to hospital with intestinal obstruction are in very poor general condition when first seen It is no good taking a patient to the theatre if he is unfit for operation The most useful test to employ in determining a patient's fitness for operation is an estimate of his systolic blood-pressure If a patient's blood-pressure is below 100 mm of mercury systolic he is usually unfit for operation without preliminary supportive treatment A blood transfusion is the best method of raising the blood-pressure In the case of an ectopic pregnancy where rupture has occurred the blood-pressure may be very low but it is usually possible to give the patient back some of her own blood soon after opening the abdominal cavity Intravenous saline is a very temporary advantage In any patient with intestinal obstruction, where vomiting has occurred, there is usually a deficiency of chlorides, and this requires replacement Sodium chloride is given intravenously with the fluid in isotonic solution

From experimental studies on the blood analysis of patients suffering from intestinal obstruction, the consensus of opinion is that not only is there a loss of chlorides, but there is a disturbance of the sodium-potassium balance of the blood cells There is a lowering of the intracellular potassium It is inadequate to give sodium alone, potassium is required in addition This can be given by intramuscular injection or added to the intravenous fluid The use of cortisone is a great help as a stimulant and should be given in intestinal obstruction cases Cortisone has the peculiar effect of mobilising the intracellular potassium It is an obvious advantage to add cortisone or one of the comparable preparations (ACTH) to the intravenous saline

Those who have operated upon cases of intestinal obstruction which are in poor condition realise the manner in which, following what appears to be a reasonably successful operation, the blood-pressure continues to fall, and it is very difficult to raise it Repeated stimulants are of some benefit but there is obviously some gross physiological disturbance which is not being corrected To give cardiac stimulants alone is inadequate The adjustment of the potassium entity appears to be one of the important factors in rectifying post-operative collapse and so helps to improve the patient's general condition Not only does cortisone help to adjust the sodium-potassium balance but it also decreases the fluid exudate into the lumen of the bowel The removal of toxic bowel contents by nasogastric suction and the administration of potassium are two methods whereby this dangerous low blood-pressure can be rectified to some extent The disturbed sodium-potassium mechanism interferes with the function of the red blood cells in oxygen transport Thirty grains of potassium chloride should be added to the intravenous fluids The quantity of potassium required by the body is much less than the sodium requirements, probably about one-sixth, but is essential none the less Histamine shock is also an important factor

In some cases of intestinal obstruction due to massive peritoneal adhesions it may not be possible or practical to resect a damaged loop of gut, and some means must be adopted which will decrease the risk of a subsequent obstruction in cases where further adhesion is inevitable The practice of separating the kinked loops and then plicating them into parallel columns has been adopted with advantage The bowel is sewn into parallel lines of about 5 in lengths The

(1) *those without* an accessory fistula to the urogenital system and (2) those with an associated fistula present Each group is further subdivided by the level to which the ampulla of the rectum reaches in the first group, and the nature of the associated fistula in the second group Fig 36 indicates the groups and subvarieties In the first group the termination of the rectum may be low, medium

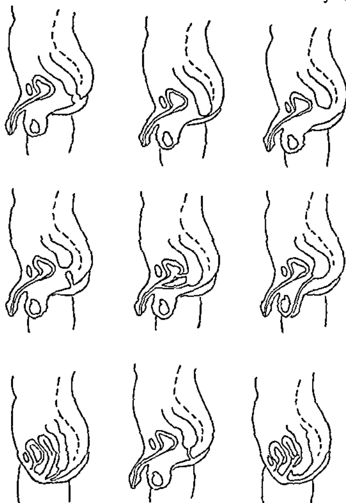


Fig 36
Diagram illustrating varieties of imperforate anus in infants

or high In a small number of cases a deep anal pit may be present at the site of the anus but it is a blind sac not communicating with the rectum *This* type is usually not detected for several days after birth as the child looks to be anatomically normal

Lu [83] records the incidence of malformations of the anus and rectum in China as occurring in between 1 in 5,000 and 1 in 10,000 children born In *about* 30 per cent of the cases there is an associated fistula present between the rectum and

vomiting by keeping the stomach empty After anæsthesia is induced the patient should be put into the slight Trendelenburg position, so that if vomiting does occur the fluid comes out of the mouth more easily and is less likely to be aspirated into the respiratory system

Spinal anæsthesia may be suitable for early cases of intestinal obstruction where the patient's condition is good This applies to early cases of strangulated hernia If the patient does vomit he is at least conscious and the fluid comes out, as reflexes are present to prevent aspiration into the air passages Spinal anæsthesia also has the advantage that following the operation the patient's bowels are liable to act, which is an advantage The blood-pressure should be determined before giving a spinal anæsthetic, particularly in a condition where the pressure is liable to be lowered by the nature of the illness

Quite extensive operations can be undertaken under local anæsthesia in patients in poor condition For abdominal local anæsthesia a large quantity of weak solution is necessary A strong sedative is also required, this allays the discomfort of bowel handling Any patient who has sustained an intestinal obstruction must be handled very carefully following operation In patients in poor condition it is essential to exercise every care with them before, during and after operation in order to get them through their serious emergency Patients admitted to hospital in a very ill condition are always very appreciative of attention given to them when they have recovered

INTESTINAL OBSTRUCTION IN THE INFANT

In considering intestinal obstruction in the infant, children under the age of 3 years are referred to Certain congenital abnormalities, such as the varieties of imperforate anus, are much more common amongst the indigenous inhabitants of some tropical climates than in people of European origin, while the reverse is the case in respect of other conditions such as congenital pyloric stenosis Imperforate anus is the commonest cause of intestinal obstruction in infants in West Africa, intussusception is less frequently seen, strangulated hernia in young children is rare Congenital pyloric stenosis is seen from time to time, but is not common All other forms of intestinal obstruction in children under the age of 3 years are exceptionally rare Andersen,[77] working in rural India, reports 14 per cent of cases of intestinal obstruction in patients of all ages as being due to some form of congenital defect Presumably most of the cases due to congenital defect were seen in young children, this group did not include his cases of strangulated hernia Ma and Yin[82] noted that in Shanghai acute intestinal obstruction in childhood and infancy was found to be most commonly due to intussusception, and strangulated hernia was the next most frequent cause Imperforate anus was much less frequently seen than either of the other two conditions mentioned Abdominal tuberculosis and ascariasis accounted for a small number of the cases All other causes of intestinal obstruction in young children were rare

Imperforate anus is slightly more common in female infants than in male children There are several varieties of the condition The two main groups are

three or four days By this time there is marked abdominal distension If no X-ray facilities are available in country stations the distance between the skin and the apex of the defective rectum can be determined by inserting a serum needle attached to a syringe at the position on the perineum where the anus should be situated By directing the needle towards the middle of the sacrum the rectum will be entered The child is anæsthetised and held in the genupectoral position When the rectum is entered, air from the rectum under pressure displaces the barrel of the syringe

In treatment of this condition the rectum should be entered from below Where a skin obstruction only exists, treatment by incision is simple Subsequent dilatations of the anus are not necessary if skin only constitutes the obstruction If the rectum ends at the middle or high position, the apex should be sought with a serum needle and syringe as above described By going slightly backwards no damage is likely to be produced If the needle does not enter the rectum it can be partly withdrawn and inserted slightly more forwards With the bulb of the rectum well distended with gas on the second or third day it can usually be entered without difficulty even when the rectum ends in the high position As soon as gas enters the syringe the needle should be inserted a further centimetre so that it does not become displaced from the rectum on escape of the gas present A narrow bladed Bard-Parker scalpel, No 11, is then inserted along the track of the needle, keeping posterior to it in position When the scalpel point enters the rectum there is a rapid escape of gas and meconium Care is necessary to keep the needle in position while the scalpel is removed Along this scalpel track a sinus forceps is inserted into the rectum The rectal opening is slightly dilated With the sinus forceps still in position an oiled No 8 or 10 rubber catheter is inserted and pushed well up into the rectum for several inches It is then sutured to the skin of the perineum so that under no circumstances does it come out for seven days The escape of gas and meconium relieves the child

The practice of undertaking a preliminary colostomy, even though the rectum is in a high position, is not recommended The death rate following attempted colostomy is close on 100 per cent The infant's abdomen is already grossly distended, and if any opening is made much distended gut prolapses, this is difficult to put back into the abdomen and highly dangerous to open The child cannot afford to wait for several days before the distension is relieved The operation should be undertaken from below in all cases in order to keep the procedure extraperitoneal On removal of the rubber catheter one week after insertion a granulating track will have formed It is essential to keep the track dilated periodically The track ultimately epithelialises General anæsthesia is required for subsequent dilatations Using the perineal extraperitoneal approach to the rectum the operative mortality is not more than 20 per cent It would be much lower if cases were brought for treatment at an earlier stage

In female infants with rectovaginal fistula present, treatment is not usually urgent, although the condition is æsthetically offensive, it is not dangerous to life Relatives are usually very insistent on treatment being given, but it is probably better to wait until the child is from 8 to 10 years old Operation for this condition has been undertaken within the first year on a few occasions,

some part of the urogenital system If a fistula of even minute size is present, it is possible for gas to escape from the bowel Urgent symptoms do not therefore occur in these cases at an early stage The time at which infants were brought for medical advice in his series was noted and the average time recorded The figures are of interest

Group 1—Without fistula present

Type A	Skin obstruction only	Age 48 hours
Type B	High rectum variety	Age 92 hours
Type C	With anal pit present	Age 141 hours

Group 2—With associated fistula

Type A	Recto-urethral fistula in male	Age 58 days
Type B	Rectovaginal fistula present in female	Age 176 days
Type C	Rectoscrotal fistula in male	Age 5 years

If an infant has a complete intestinal obstruction due to an imperforate anus it invariably dies within seven days unless relieved by operative means Cases have been reported of infants with an imperforate anus surviving without relief of the condition for prolonged periods In all these cases there is invariably at some point a small fistula present, it may be of minute size but sufficient to let gas escape The fistula may be extremely difficult to detect, it might be wellnigh impossible to find it where in a male infant the fistula enters the posterior urethra Punctures in bicycle tubes are detected by placing part of the inflated tube beneath water in a bucket The same method can be employed with a baby quite easily, placing the lower half of the baby's body in a warm bath for fifteen minutes, a persistent leak of bubbles from the urogenital system cannot fail to indicate the presence of a fistula

If in Group 1 cases the rectum reaches to the perineal skin, the perineum bulges when the child strains with crying There is also obvious resonance on percussion of the perineum when the child is examined in the inverted position with legs flexed This type can be relieved easily by incision of the skin at the most prominent part of the bulge, which corresponds approximately to the expected position of the anus The level to which the rectum reaches can be determined easily by X-ray examination of the baby in the inverted position so that the gas in the rectum goes to the most distal part of the rectal ampulla A metal button used as an indicator is put on the skin at the point where the anus might be expected to be The distance between the rectal air shadow and the button shadow indicates the length of rectal defect X-ray photography magnifies the length of the defect slightly, this should be remembered in interpreting the films taken Air does not enter the rectum until twenty-four hours after the baby is born. In female patients with an accompanying fistula present the point of entry to the urogenital system is usually the lower third of the vagina The fistula may enter at a higher level or even into the bladder In male patients the fistula usually enters the posterior urethra or the bladder

If in the case of imperforate anus an anal pit is present, the length of the pit should be measured by a blunt probe inserted in that area These cases are usually brought to hospital late, when the child is noted to have passed no motions after

pain The first motions passed are apparently normal, but subsequently small amounts of blood-stained motions are passed at frequent intervals A tumour mass can be felt in the abdomen in a high proportion of the cases It may not be detected if the child strains while being examined If the abdomen cannot be examined in the relaxed state it is advisable to give the child an anæsthetic Intermittent screaming attacks interposed by quiet periods and the passage of blood and mucus in the motions are strongly suggestive of intussusception If children are examined in bed *without removing the bedclothes they are usually* very good and can be examined quite adequately

From the reports noted, intussusception seems to be more common in China than Africa relative to children Ma and Yin[87] presented 139 cases of intestinal obstruction in infancy and childhood and found intussusception to be the most common cause of the condition, sixty cases being noted in this series In Africa, imperforate anus was found to be the most common cause of intestinal obstruction in infants Shea[84] collected 630 cases of intussusception in children admitted to the Shanghai hospitals

In any place where a condition is very commonly seen the local doctors become expert in the treatment of the condition The public also become acutely aware of *the disease and they tend to send cases to hospital at an early stage* The results of treatment for these reasons are usually very good by comparison with those noted in areas where the condition is less well appreciated

The results of treatment in this series presented from Shanghai are remarkably good Comments on the methods of treatment adopted are therefore worthy of careful consideration Of the 630 cases treated, 602 recovered and twenty-eight died, a mortality of only 4 4 per cent The line of treatment advised is, in cases seen within the first twenty-four hours first, a low-pressure barium enema is *given (pressure column 30 in)*, if success is not achieved as judged by radiology, a high-pressure enema is given (pressure column 50 in) If success is not achieved by either procedures or reduction is incomplete, immediate operation is undertaken *Reduction by barium enema was achieved in approximately three-quarters of the* cases Much surgery was thus avoided

The advantages of the method are

1 Lowering the mortality rate to a very low figure (4 4 per cent)
2 If reduction is incomplete, operation can be done through a small *incision*
3 Shortens hospitalisation
4 Less expensive to hospital and parents

Disadvantages

1 Underlying organic lesion if present not detected—rare
2 Only considered to be of value in ileocæcal type of lesion

The method is suitable for use in cases seen within twenty-four hours of onset of condition. Reduction took on an average twenty minutes to procure Complete reduction was considered to have *taken place if the cæcum filled* completely with barium, in many cases barium was seen to enter the ileum If the condition was adequately reduced the child almost invariably passed a fæcal

separating the rectum from the back of the vagina as carefully as possible, using a vertical incision in order not to increase the opening present in the rectal mucous membrane With mobilisation of the rectum the opening has been rotated down to the area for the new anal orifice After suture of the skin and mucous membrane edges of the junction, it is necessary to place six additional sutures through a larger bulk of tissue in order to act as tension stitches, otherwise the new junction will not hold and the rectum will again slip up to the original position In about 50 per cent of the cases the operation is successful and in the other 50 per cent it fails and the child passes fæces through both the new anus and the original fistula A small vaselined gauze-covered rubber tube should be put in the rectum following operation, and sutured in position to keep it in place for some days The child should be given a dose of streptomycin appropriate to its small weight to decrease the risk of infection in the perineal area In spite of an absence or defect of the anal sphincter in patients with imperforate anus, they are usually not incontinent in later life Many of the patients tend to suffer from constipation rather than incontinence



FIG 37
Intussusception in infant with prolapse through anus

Intestinal obstruction due to failure of canalisation of the intestine at some point has not been noted clinically Two cases have been seen at post-mortem examination It does not appear to be a common cause of intestinal obstruction in patients in the tropics No cases of stricture of the ileum have been noted at the site of Meckel's diverticulum

Intussusception is a very serious form of intestinal obstruction in infants The condition is seen much more frequently in European infants than in African babies This may be due to the later weaning of children, and the lack of solid food at an early age in the latter The ileocæcal type of intussusception has been the type most commonly encountered in the tropics, almost all cases being of that variety If an intussusception in an infant is not treated at an early stage it may proceed along the colon and prolapse through the anal sphincter Fig 37 shows such a case The condition initially looks like a prolapse of the rectum, but on careful examination it is noted that the finger can be insinuated between the prolapsed mass and the anal sphincter This cannot be done in cases of prolapse of the rectum Whereas an intussusception in an adult seldom proceeds beyond the middle line in the transverse colon, it does so frequently in infants

An intussusception in an infant comes on suddenly and is associated with obvious distress and intermittent attacks of screaming The bowels move with the

Although it is conceded that infants do not stand intestinal resection well, this has personally not been found to be the case If an irreducible intussusception is found in the right side of the colon in a child, a complete resection of the mass is undertaken with reconstruction of the continuity of the bowel The mortality rate has been about 20 per cent If the intussusception has proceeded to the left side of the colon, involving the splenic flexure, complete resection is a highly dangerous procedure because of the difficulty of dealing with the splenic flexure area In these cases an ileocolonic anastomosis has been made between portions of the gut above and below the intussusception in order to form a by pass and so relieve the obstruction, the intussusception being left entirely alone The results have been very satisfactory With this operation the mortality is also about 20 per cent These results are not as good as those claimed in China, but it seems likely that our cases are seen at a rather later stage of the condition The prognosis is good if the case is seen on the first day, fair if seen on the second day, poor if seen on the third day and usually hopeless if seen on the fourth day No cases of chronic intussusception have been noted in infants

Attempts at reduction of intussusception in infants are invariably made when the abdomen is opened In most cases seen it is quite obvious that the condition is very unlikely to reduce by digital pressure exerted from beyond the apex of the intussusception Not more than ten minutes by the clock should be taken in attempting to reduce the mass The mass should never be opened to do this is fatal The peritoneal cavity is soiled, the tissues are grossly œdematous—and when repaired may leak. If manual reduction cannot be achieved easily a resection should be undertaken in right-sided cases and a by pass operation performed in cases where the intussusception reaches the splenic flexure of the colon Fig 33 shows an X-ray taken of a small boy for whom a by pass operation was performed five years earlier A transverse colon intercolic intussusception had occurred, involving the splenic flexure The normal channel and also the anastomotic opening seemed to be working when the X-ray was taken to demonstrate the case at a medical meeting

Strangulated hernia is not often suspected as a cause of intestinal obstruction in young children, but it may be seen from time to time The youngest patient seen and operated upon personally was 5 days old The strangulated gut was purple in colour, but fortunately it was not gangrenous, and a resection was not necessary, the baby recovered Browne[8] reported a similar case in the journals Considering the frequency with which infantile herniæ are seen, it is surprising that strangulated hernia does not occur more frequently in infants The condition has been seen on only five or six occasions under the age of 2 years Non strangulated herniæ are dealt with very frequently in children under the age of 1 year The subject of strangulated hernia is dealt with in another section

Congenital pyloric stenosis is a condition seen much more frequently in European infants than in African babies The fact that very few cases are reported in the journals from India and China suggests that the condition is not common in either of these enormous territories The condition is not common in West African infants, but six cases have been operated upon in African babies by me in twenty years The condition appears to be particularly rare in African

motion within two hours If no stool was passed, an enema was given In successful cases the palpable mass disappeared completely Following reduction, charcoal was given by mouth and this was usually passed in successful cases four to six hours later

Shea[85] reported a series of 164 cases of intussusception treated by the barium enema method Most of the cases seen by him were of the intercolic type, this type is usually more difficult to reduce than the ileocæcal variety The value of his article is that it points out the likelihood of success during the first, second and third days in this variety In the first twenty four hours after the onset, 43 per cent were reduced by the barium enema method In the second twenty four hours, 21 per cent were reduced, and in cases seen after forty eight hours, only 15 per cent of the cases were treated successfully by barium conservative means

In using the barium enema pressure method for all varieties, a 50 per cent success rate may be expected in early cases Considering the simplicity of the method and the absence of complications observed, it might reasonably be used more frequently if X ray facilities are available In many places there are no X ray facilities, unfortunately

De Venecia,[86] working in the Philippine Islands, reports a short series of cases which will be of much interest to those in country stations where no X-ray apparatus is available Intussusceptions of under twenty four hours' duration were treated by gas pressure reduction The method advocated was successful in the five cases in which it was used There were no complications noted For a small child two solutions were used

1 Sodium bicarbonate 1 per cent solution, 180 c c
2 Pulv tartaric acid 1 per cent solution, 120 c c

Total fluid dose was 300 c c The first solution was introduced into the rectum by catheter with the child in the genupectoral position The second solution followed soon after the first The buttocks were firmly approximated to prevent the escape of gas In all the cases treated the method was successful For adults 2 per cent solutions were suggested in the same volume of fluid The method was employed without anæsthesia being given

The use of air introduced into the rectum from a sphygmomanometer by which the pressure could be estimated for the sake of safety might be easier to use than producing the air by chemical solutions With any new method it is necessary to exercise caution in its employment If cases are seen soon after the onset of symptoms, the mass may be reduced in some cases under anæsthesia, using manual pressure alone through the abdominal wall This was forcibly brought to notice on one occasion when a child with intussusception was being examined under an anæsthetic on the operation table Allowing the nurses to feel the mass, the sister asked if she might feel it, when she attempted to feel it, it had disappeared—it had been reduced by one of the nurses The result was entirely satisfactory and there was no recurrence of the condition The child was kept under observation for a few days Most of the cases seen in Africa have been brought to hospital during the second twenty-four hours

anæsthetic is used it is often quite difficult to close the abdomen The baby constantly pushes omentum into the wound and it is thus not easy to suture neatly General anæsthesia is more suitable for the operation and is recommended The incision in the epigastrium needs to be 1½ in long only The incision on the surface of the stomach over the pylorus needs to be 1 in long, it should go through the serous coat of the pylorus and a few fibres of the muscle only At this stage the scalpel is abandoned for safety The remaining muscle fibres of the pylorus can be broken through by using the point of a pair of fine mosquito forceps Once the mucous membrane of the stomach is reached at one point the point of the forceps can be insinuated gently between the muscle and the mucous membrane, and the muscle fibres are divided with an upward movement in order to decrease the risk of damage to the mucous membrane of the duodenum at the point where it forms a slight recess beyond the hypertrophied sphincter muscle This method of using an artery forceps to divide the muscle is very safe for those who have undertaken only a limited amount of surgery, and having started this way myself and found it satisfactory and safe there appeared no good reason to abandon a very good method The forceps method of carrying out a Ramstedt's operation for pyloric stenosis has the further advantage in that when the muscle fibres are lacerated rather than cut, severe bleeding does not occur No ligatures or stitches are usually required in the stomach following the section of the muscle When the muscle is adequately divided the mucous membrane bulges freely into the gap left by the divided muscle The abdominal wall is closed in two layers After sutures are completed a swab is put over the wound and a complete 3 in elastoplast band put right round the child s body, this gives firm support and is left on for ten days The wound need not be looked at unless the temperature indicates that infection is present Healing by primary union is usual For twelve hours after operation water only is given The next day the baby is put back on short breast feeds There appears to be no advantage in continually feeding the infant with a spoon The operative risk in a Ramstedt s operation is very low unless the child is in very poor condition before the procedure is undertaken The cases are much improved if, for twelve hours before operation, continuous rectal fluids are given to the baby There is usually no vomiting following operation and the infant starts to gain weight on about the fifth day

No cases have been noted where an obstruction of the œsophagus was present in an African infant due to congenital defect in the œsophagus or trachea

ABDOMINAL HERNIÆ NON STRANGULATED

In dealing with non strangulated abdominal herniæ in the tropics, as opposed to non tropical areas, there are three main problems to be considered

1 The diagnosis of cases complicated by the presence of tropical diseases
2 The methods of dealing with advanced and complicated herniæ
3 The facilities and materials available for dealing with difficult cases

Operations for dealing with complicated and advanced abdominal herniæ may be extremely difficult, even under ideal conditions Where limited facilities

infants in East Africa, considering that such an eminent authority as Gelfand[88] reported in 1955 that he then saw the first case of the condition in his personal experience in an African baby The condition has been seen in the young children of Syrian traders on three occasions in West Africa, and confirmed in all cases at operation Luder[89] also notes the rarity of the condition in African children in East Africa Petcher[90] reported two cases in African babies from Nigeria in 1953 Marks[91] reports a series of twenty-five cases dealt with in Salisbury in East Africa but these were in European infants, which accentuates the enormous discrepancy in the incidence of the condition in the different communities Huang Tsui-Ting[92] noted three infants all of the same family in China who suffered from congenital pyloric stenosis, suggesting that there is a familiar trait associated with the condition Most of the cases treated personally were referred to the Surgical Department by the local doctors

Many of the cases arrive at a late stage of the condition, the diagnosis being by then obvious and the children very ill Pyloric stenosis in infants occurs almost exclusively in males The diagnosis is based on six points

1 Frequent projectile vomiting during or after food
2 A failure of the infant to gain weight
3 The onset of constipation
4 Visible gastric peristalsis
5 A palpable pyloric tumour
6 A " long pyloric canal " on gastric lipiodol X-ray examination

Mason Brown in his post-graduate lectures in Edinburgh suggests that lipiodol is more suitable than barium suspensions for X-ray examination of infants where an opaque medium is required Barium makes babies very constipated and is hard to expel In cases operated upon, a pyloric tumour could not be felt through the abdominal wall before operation in about 50 per cent of the cases Many doctors are unwilling to diagnose pyloric stenosis in infants unless a palpable tumour is felt Visible peristalsis seldom occurs in the stomach unless pyloric obstruction is present If visible peristalsis is seen, the detection of a pyloric tumour is not necessary before diagnosis of congenital pyloric stenosis In order to demonstrate visible peristalsis, if not already easy to detect, it is necessary only to give the infant one-sixth of a Seidlitz powder, this fills the stomach with gas and the peristalsis can be seen very easily Medical treatment in this condition is of limited value and to persist in non-operative measures may allow the infant to slip into the high risk class unnecessarily If medical measures do not produce obvious improvement within three days they should be abandoned This condition is usually operated upon under a local anæsthetic, a dose of chloral hydrate and potassium bromide being given appropriate to the baby's weight before operation The baby may well vomit the medicine, however To give the baby a comforter dipped in a sweet solution is equally helpful

When local anæsthesia is used, it is necessary to restrain the child by bandaging it on to a padded wooden cross The legs are bandaged to the upright bar and the arms to the cross bar The operation is much easier under a general anæsthetic and most babies stand the anæsthetic very well When a local

In hydrocele cases the testicle is enlarged but the skin of the scrotum can be invaginated into the inguinal canal which contains only the spermatic cord The testicular enlargement is due to the fluid contained in the *tunica vaginalis* The testicles are usually of unequal size The transmission of light through a hydrocele is not a reliable test for hydrocele except in early cases The presence of marked thickening *of the tunica vaginalis*, as seen at operation, and the frequent accumulation of old blood looking not unlike cooked mince-meat, as well as the pigmentation of the skin of the scrotum in patients in the tropics, makes transmission of light through these hydroceles impossible in more than 50 per cent of the cases Light transmission is of little value in the diagnosis of hydrocele The skin over the surface of a hydrocele is essentially normal unless infection in the tissues has occurred The skin may be stretched but the texture is not altered, and it moves freely over the main mass In cases of elephantiasis of the scrotum there is essentially *a marked thickening of the skin The skin pits on pressure, due to* deep-seated œdema being present Elephantiasis of the scrotum is essentially a bilateral condition whereas hydrocele is frequently not so In a high proportion of cases of elephantiasis of the scrotum there is a hydrocele also present in addition, on one or both sides As opposed to this, in some cases of scrotal elephantiasis the testicles may be normal in size, with no hydrocele being present This fact is contrary to the opinion of some writers Photographs are shown in Chapter 30 of a large elephantiasis of the scrotum with normal testicles present on both sides No fluid was let out of the tunica on either side in this case

Funiculitis or inflammation of the spermatic cord is usually a painful condition, the patients often resent examination because of the discomfort present There *is thickening of the cord structures from the testicle right up into the inguinal* canal Extensive thrombosis of the veins is usually encountered There is an associated œdema of the tissues surrounding the cord The condition may at times be mistaken for a strangulated hernia The two conditions may frequently be very like each other Funiculitis is not infrequently due to guinea worm disease affecting the cord A photograph is shown in Fig 94 of a marked thickening of the cord due to guinea-worm infection with the worm protruding near the groin Calcified guinea worms are not infrequently seen in X-ray photographs of the pelvis where the worms are seen in the tissues about the scrotum and groins

From a series of over 2,000 hernia operations over many years it is seen that inguinal hernia is twice as common on the right side as the left side In female patients in the tropics inguinal *hernia is much more common* than femoral hernia This is contrary to popular opinion The frequency with which femoral hernia becomes strangulated gives the impression that femoral hernia is more common than inguinal hernia in women, but this is not correct *In tropical surgical practice* femoral hernia in men is much more common than femoral hernia in women This does not appear to be the case in Europe For anatomical reasons inguinal hernia in women is not complicated by the tropical conditions affecting male patients Little difficulty therefore arises in the diagnosis of herniæ in women The treatment is also not so complicated Certain aspects of treatment of individual herniæ will be dealt with separately and points considered which require particular attention in surgical practice in these circumstances

are available the problem is even more difficult An abdominal hernia is a protrusion of abdominal contents through a localised constriction into an abnormal confined space Most abdominal herniæ are found penetrating the inguinal areas of the abdominal wall Only a small proportion of abdominal herniæ are of the internal variety, where an intestinal loop enters into a peritoneal recess Most doctors working in the tropics, where medical facilities are very limited other than in the large towns, see a much greater number of external herniæ than they would see working in medical practice in temperate climates The impression is gained that hernia is a more common condition in the tropics than in non-tropical areas of the world This is probably not correct The number of hernia operations undertaken in non-tropical areas vastly exceeds the number of cases operated upon in the tropics The number of operations undertaken for these conditions by any individual doctor may be much larger in tropical hospitals than the number undertaken by individual doctors in temperate climates It must be remembered that the number of hospitals and doctors in temperate climates far exceeds the numbers in the tropics In spite of the enormous number of hernia operations undertaken annually in the United States of America, the Health Authorities report that the sale of trusses exceeds a million per year, suggesting that not less than a million herniæ remain unoperated upon in that country Undoubtedly surgeons in tropical areas operate on a much higher proportion of advanced and complicated cases than do doctors working in non-tropical areas

There are four conditions seen commonly in tropical areas which complicate the diagnosis of swellings of the inguino scrotal area in the male patient It is necessary to differentiate carefully between each of these conditions These are inguinal herniæ, elephantiasis of the scrotum, hydrocele and funiculitis or inflammation of the structures of the spermatic cord Difficulty arises as patients may have one, two, three or all four of these conditions present at the same time It is therefore essential to have some salient features in mind which characterise each condition in order to arrive at a correct diagnosis Hernia patients should be examined initially in the standing-up position, whether they be male or female patients Male patients with other conditions present about the scrotal area should also be examined in the standing-up position The four most important characters to look for are

1 To note the reducibility or otherwise of the inguino-scrotal swelling
2 The physical characters of the testicle within the scrotum
3 The type of the scrotal skin and its relation to the underlying structures
4 The feeling of the spermatic cord at the entrance to the inguinal canal

A small but definite inguinal or femoral hernia is usually not difficult to diagnose if it is uncomplicated by other conditions The presence of an expansile swelling on coughing situated over the inguinal ring suggests the condition, and its reducibility into the inguinal canal is sufficient to confirm the nature of the condition as being an inguinal hernia Femoral hernia can be reduced into the femoral canal in many cases A limited number of the cases cannot be reduced back into the abdominal cavity because of inflammation present in the sac In these cases the inguinal or femoral canal contain the mass which cannot be displaced

wounds are closed with No 000 catgut Using this fine absorbable material the stitches do not need to be removed as they come out with the dressing or when the baby is being bathed one week later The wound is dressed with a small piece of gauze and a covering of elastoplast Children are kept in hospital two days only for hernia operations A few days more may be necessary if there is marked swelling of the scrotum following operation It is an advantage for breast fed infants to be nursed by the mother following operation, by this means the child is kept quieter than if attended by nurses alone In operating on infants for inguinal hernia skin-edge towels are not used as the skin wound is very small and towels would be in the way The skin is usually easy to clean and healthy These cases very seldom become infected If penicillin is thought desirable in certain cases it can be given by mouth The child is better not upset by injections Penicillin is not used as a routine Babies should be given sedatives following operation to prevent them crying or straining unnecessarily

The incidence of hernia may be predisposed to some extent in the tropics by the very usual practice of carrying tiny babies by tying them on to the mother's back As pointed out by Hoffman,[80] in this position the lower abdomen is markedly relaxed as is also the inguinal ring The recurrence rate of hernia in children following operation is seen to be about 2 per cent, but this figure should probably be multiplied by two or three to get the true recurrence rate, which is probably between 4 and 6 per cent The recurrence rate is therefore very comparable to that seen in adults In adult male patients three-quarters of all the inguinal herniæ seen are of the oblique type, one-quarter are of the direct type The direct type of inguinal hernia is frequently associated with some form of urinary obstruction, though not in all cases

Low spinal anæsthesia is eminently satisfactory for hernia operations in adults in the tropics and is very popular A small proportion of patients prefer general anæsthesia to spinal anæsthesia Local anæsthesia is both time-consuming and not entirely satisfactory for hernia operations It is very useful for a limited number of patients in poor condition and elderly persons unfit for general anæsthesia Adequate sedation is necessary before local anæsthesia is used

In the tropics it is highly desirable to use skin towels during operations of all sorts it is of particular importance when operating on herniæ or when performing scrotal operations The scrotum in adults is particularly difficult to clean adequately The marked sweating during operations may predispose to skin infections as a result of the high temperature and high humidity present, this is particularly so where air conditioning is not in use in the operating theatre If in addition to the hernia being present there is other pathology associated with the [illegible] If the skin is exposed
o be handled, infection
Direct handling of the
tissues and inadequate hæmostasis predispose to post-operative sepsis in wounds These two factors markedly jeopardise the results in operations undertaken by doctors with limited experience It is quite obvious that there is a much higher [illegible] han in
ıg

Prior to the institution of Government maternity services in the tropics very few babies were brought to hospital for the treatment of inguinal herniæ The number of babies now being brought for hernia operations is increasing markedly each year The suitability of the condition for early surgical treatment is now well appreciated by a high proportion of the general population in the large towns and in many of the country villages Infants under the age of 2 years do not produce keloid formation in surgical scars, irrespective of the site of the wound In infants it is seldom necessary to undertake repair of the inguinal canal following the removal of a hernial sac A ¾ in incision is all that is necessary in undertaking hernia operations in babies The site of the incision is downwards, forwards and inwards over the external inguinal ring After the skin and superficial fascia are incised the scalpel can be abandoned With a small incision there is very little bleeding The edges of the wound are elevated with fine tissue forceps The external and internal spermatic fascia are perforated with pointed mosquito forceps The opening in the tissue layers is stretched by opening the blades of the forceps When the correct level is reached the spermatic cord can be lifted out of the pre-pubic area If the internal spermatic fascia is not penetrated, the impression is gained that something is holding the cord down, as indeed it is When this layer is perforated the cord comes up quite easily The hernial sac is situated on the inner aspect of the cord The sac can be identified by its clear opal-like appearance The apex should be gripped in an artery forceps and the fascial layers gently pushed off and away from it It is necessary to exercise considerable care to avoid injuring the vas deferens, which is very fragile and liable to be broken across if direct pressure is exerted on it in clearing the sac Scissors are suitable as a separator and dissector When the apex of the sac is cleared it can be opened, letting air into the peritoneal cavity and so allowing any peritoneum in the sac to fall away from the hernial sac This ensures that no omentum will be caught in the sac when a thread suture is put through the neck of the sac The external inguinal ring is not opened at all When the sac is pulled out under slight tension one thread stitch is placed in the neck of the sac and tied firmly Medium thickness cotton thread is considered more suitable for this purpose than catgut, as it is more durable and less likely to slip than catgut The neck of the sac should not be cut off too close to the ligature, ¼ in being suitable If a complete congenital hernia is present it is necessary to divide the tubular process of tunica vaginalis the distal part is left *in situ* and the proximal part removed Hernia operations in children are undertaken under general anæsthesia Oxygen should be given with the anæsthetic in all cases , this is particularly important in African patients where sickle-cell disease occurs in about 20 per cent of the patients Inadequate oxygenation during anæsthesia is particularly dangerous to patients with this condition The method of approaching the neck of the sac through an opening made in the external and internal oblique muscles above the position of the external inguinal ring and without opening the ring is considered unnecessarily traumatising With little traction on the sac that is being tied off a position equally high can be reached, as when the muscles are divided and the neck of the sac is approached from above A much larger incision is necessary if an approach to the neck of the sac is made through the abdominal wall muscles Baby hernia

the swab in the wound should be embarrassed The wound closed a few days after the removal of the swab If the vein is not tied it very frequently tears when the cord is lifted up out of its bed, and much bleeding is produced The torn ends of the vein retract into the fascial layers and cannot be gripped accurately A large marble-like hæmatoma at the upper part of the scrotum, so frequently seen in the early days of surgery in the tropics, is usually due to faulty technique in reference to this vein It is not easy to appreciate the reason for the constant position of this frequently seen hæmatoma and so it is worth making special mention of this quite important point in technique This hæmatoma, when it forms, takes up to two months to absorb and patients are quite uncomfortable as a result of it If the operation field is soiled by blood it is much more difficult to see the individual structures which are being approached After the vein has been tied the cord can be lifted up complete and a finger insinuated under it When the cord is isolated a large, closed, artery forceps is placed under the cord from the medial to the lateral side The forceps keeps the cord uppermost in the field of operation In an unsoiled field it is very much easier to identify the hernial sac quickly

The lack of precision in some of the surgical books in describing the position of a hernial sac predisposes to errors in finding it The hernial sac in an indirect inguinal hernia leaves the peritoneal cavity through the internal inguinal ring on the medial aspect and slightly below the cord It then runs to the medial side of the cord, and as it proceeds over the pubis it reaches the front of the cord The relationship is therefore approximately inferior, medial and superior from above downwards The sac should in all cases be approached from the medial aspect of the cord If it is looked for from the lateral side there will be much bleeding and tearing of veins in the cord plexus Failure to approach the sac from the correct position initially makes the operation much more difficult There are five fascial layers covering the cord In removing the sac it is desirable to remove four of these The only layer left on is extremely thin If an attempt to remove it is made the sac is liable to be torn In removing the fascial layers from the sac it is desirable to remove all the blood-vessels without tearing them unduly The major parts of the blood-vessels are between the external and the internal spermatic fascia In dissecting out the sac it should be held up with artery forceps in the left hand and pointed scissors used in the right hand An assistant lifts up the fascial layers with two pairs of non-toothed dissecting forceps The scissor points are insinuated beneath the fascial layers and separated in order to lift up the layers of fascia There is a very small blood supply between the fifth fascial layer and the sac The base of the sac can be cleared most efficiently if a finger is put into the sac after it has been opened , in this way the sac can be stretched and the coverings are made easier to separate One medium linen thread suture should be used only in tying off the neck of the sac It is inserted with a non-cutting needle and tied at both sides Not less than ½ in of redundant sac should be left in the case of adults when the main mass of the sac is removed There is usually a 2 or 3 mm slide of sac after the tension is removed This slide between the position of the stitch and the cutting off of the sac should be allowed for Many cases were encountered in the past where thick Chinese twist silk was used to tie off the neck

been a junior doctor myself at one stage, the difficulties of juniors are well appreciated, which is one of the arguments in favour of this book being published Having made a large number of mistakes myself it is possible to look on the mistakes of others more leniently

The enormous wound made for hernia operations performed in temperate climates as a standard practice is not justifiable in tropical surgical practice where keloid formation is troublesome Fortunately inguinal incisions do not form much severe keloid except at the inner end of the wounds on occasions The medial end of a hernia incision should terminate not more medially than the pubic tubercle This leaves approximately 2 in in a male adult patient between this position and the base of the body of the penis If the area medial to the pubic tubercle is encroached upon, marked keloid formation will occur in a fair proportion of the cases, it therefore should be avoided as far as possible In almost all cases three [illegible]

cord structures are pathological and difficult to recognise due to certain tropical diseases Having divided the skin and superficial tissues and cleared the structures down to the level of the external oblique aponeurosis and external inguinal ring, a finger should be placed in the external ring and drawn slightly upwards This accentuates the highest point of the arch of the external inguinal ring A 1 cm incision is then made in the aponeurotic fibres of the external muscle in the line of the fibres which reach the top of the external inguinal ring Through this 1 cm incision a blunt-pointed pair of scissors is inserted from above downwards and the fibres divided, thus opening the external ring at its highest point At this stage it is very helpful to grip, with artery forceps, the two points which correspond to the position where the ring was opened, one above and one below These large forceps are then drawn, one upwards and the other downwards, exposing the spermatic cord structures The fascial layers surrounding the cord are now lifted and a pair of scissors put between the cord and the inner aspect of the inguinal ligament By gentle lateral pressure the cord can be separated from its bed

Beneath the cord there is a large vein visible which is the pubic branch of the deep inferior epigastric vein This structure is very much larger in patients in the tropics than is usual in patients operated upon in temperate climates This vein is not particularly conspicuous in European subjects and so no particular name is given to it in the anatomy books, but in the tropics it assumes much greater proportions and may cause a lot of trouble when operating on hernia cases unless systematically ligated at this stage A case has been encountered where, because of much bleeding from this vein, which is difficult to grip systematically if not ligated at the early stage of the operation, a swab was pushed down on to the vein in the hope that the bleeding would be stopped by the swab The patient was seen nearly one year later because the wound had continued to discharge small quantities of pus ever since the operation was undertaken On opening up the wound the swab was removed from the exact position where the vein is placed It was necessary to exercise some tact lest the colleague who inadvertently left

be recommended In young healthy subjects the fascia removed from the leg is of a pale-yellow smooth appearance rather like the texture of silk ribbon In older subjects with filariasis present, as judged by the rough dry character of the skin of the body, the fascia lata becomes less satisfactory as a repair material, as it becomes thickened, slightly œdematous, and rather brittle in character It is a little likely to break when removed from the leg

In removing the fascia the fasciatome should be advanced centimetre by centimetre only, being withdrawn a little after each forward stroke If too long a stroke is attempted the fascia may inadvertently be cut across, the method of success is repeated short strokes kept accurately in line with the fibres of the fascia For right-handed persons it is easier to remove the fascia from the right thigh, working upwards If the left leg is used it has been found easier to hold the fasciatome in the left hand, some doctors may find it difficult to use the left hand, others find it as easy as when the right hand is used If the right hand is used when removing the fascia from a patient's left leg, it is necessary to use a rather back-hand action There is no reason why the fascia should not be removed from the right leg even though the hernia is to be repaired on the left side The position at which the fascia is most likely to be damaged during removal is at a point 4 or 5 in above the starting point It is therefore necessary to be particularly careful not to make too long a stroke when this site is being passed When the top of the fascial strip is reached, at the position of the insertion of the tensor fascia lata muscle, a sense of resistance will be felt At this point the fasciatome is turned over and with a downward stroke the fascia is cut across by one of the lateral blades of the instrument Hæmatoma formation in the leg following removal of the fascia is rare Infection is also rarely seen A 1 in incision only is necessary for the removal of the fascia The incision is placed over the prominent part of the lower end of the fascia lata about 2 in above the level of the top of the patella The leg incision is closed by one or two Michel clips The fascia after removal should not be placed in hot saline, if this is done the fascia is damaged An artery forceps is applied to each end A thread ligature is tied tightly round one end of the fascia 1 cm from its end

A special fascia lata needle is used with a large eye into which the fascia is threaded for 1 cm and tied in that position with thread The fascia is inserted into the conjoined tendon, placing the needle at the level of the middle of the cord as it enters the abdomen The needle is then inserted into the back of the inguinal ligament, keeping very superficial so that the underlying main artery is not damaged The first stitch is fixed by pushing the needle through the opposite end of the fascia lata above the thread knot, it is then pulled tight, so closing the internal inguinal ring A running suture is then placed between the conjoined tendon and the back of the inguinal ligament, making four loops from above downwards This closes the whole length of the canal posteriorly To prevent the ligature slipping, the needle is pushed through the middle of the stitches as they pass from the conjoined tendon above to the inguinal ligament below The fascia is thus brought back to the position of the top of the internal inguinal ring If so desired the last of the fascia can be threaded round the top of the ring and ended in the inguinal ligament above the internal ring A small amount of the

of the sac, a high proportion of these cases were followed by a deep-seated abscess at the site of this ligature which ultimately sloughed out In many cases a further operation had to be undertaken to remove the ligature material This occurred in some cases two or three years after the initial operation, the material was used regularly by one of my predecessors As a result of this experience this material was never used personally, it being much stronger and heavier than is necessary One medium linen or cotton thread is much more suitable Catgut is an unsuitable material for tying off the neck of the sac as it is very likely to give way before adequate healing has taken place in the deep layers An adequate repair of the posterior wall of the inguinal canal is essential for success Catgut repairs of the posterior wall should be abandoned If catgut is used the recurrence rate is high and the patients have of necessity got to stay in hospital an unduly long time The recurrence rate of inguinal hernia following catgut repairs is about 20 per cent Posterior wall repair should be undertaken with some form of insoluble material Floss nylon as recommended by Monro of London is most suitable

During the war years the supply of surgical materials to remote country stations in the tropics was inevitably poor, the problem therefore arose as to what good alternative materials might be used The supply of ligature material was in some cases reduced to the purchase of cotton thread in local shops If no infection is present in a wound, thread may give quite a reasonable repair of inguinal hernia, the results are much better than when catgut alone is used If a wound becomes infected the thread is very liable to slough out following the formation of a deep seated abscess Thread should never be used for ligature of blood-vessels just beneath the skin as the ligatures are very liable to work their way out Thread is a suitable material for ligature of blood-vessels in positions deep to the superficial fascia only Where any form of insoluble material is used for repair operations it is advisable to use interrupted sutures rather than continuous sutures, so that if infection does occur the infected suture may come out without interfering with all the other stitches If a continuous ligature is used the whole stitch frequently comes out before the sepsis settles down

Considering that thread was not an entirely satisfactory material for the repair of inguinal herniæ, Gallie's fascial graft repairs were undertaken with satisfaction Over a thousand cases were operated upon personally, using the fascial strip method, during the subsequent ten years The results appeared eminently satisfactory There is much less likelihood of trouble occurring in the leg if the fascia is removed with a Wilfred Adams fasciatome rather than by the open method under full vision This instrument is considered much the best of those available for the removal of ½ cm wide fascial strips by the closed method It has no movable parts to go wrong, and is a strongly made instrument easy to handle Figs 19 and 20 show a strip of fascia being removed with this instrument The fascial repair method is most useful in places where surgical repair materials are not freely available The method is inexpensive as autogenous material is used The removal of fascia adds only five minutes extra to the operating time With practice, fascial strips can be removed very quickly The method can be strongly recommended Small strips of fascia taken from the external oblique muscle aponeurosis are inadequate for the repair of inguinal hernia and the method cannot

sutures If the hernia proceeds down into the scrotum a sac can be removed with advantage as in oblique herniæ In some cases of indirect hernia the sac should be removed and the canal is closed completely in all cases *Removal of the sac alone is not* sufficient Braided nylon is the material of choice for inguinal herniæ repairs with many doctors It is a good material and, as in the case of floss nylon, four or five interrupted sutures only are necessary in posterior repair of the canal The rather wiry nature of monofilament nylon and the points which tend to irritate the patient when the ends of the ligatures are cut off makes monofilament nylon less suitable as a repair material for hernia cases A stitch may have to be taken out in these cases if irritation is caused by an upturned end This is a disappointment to the patient

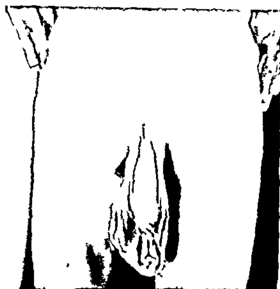


FIG 38
Femoral hernia in male patient

In the repair of femoral herniæ (Fig 38) the Lothiesen operation is considered most suitable, approaching the neck of the sac from above after opening the external inguinal ring as for inguinal hernia repair in male or female patients (Fig 39) The sac is withdrawn from beneath the inguinal ligament where the femoral canal is situated By this method the neck of the sac can be tied off higher up than when the lower direct approach over *the hernia is used* Using the upper approach it is possible to insert two floss nylon sutures between the iliopectineal fascia and the under surface of the inguinal ligament, thus reducing the calibre of the femoral canal Following the insertion of the two stitches in this position some fibrous tissue is formed locally, which helps to decrease the size of the femoral canal This limited repair decreases the risk of recurrence of femoral hernia The recurrence rate is lower if the Lothiesen approach is used than when the lower operation is undertaken



FIG 39
Large inguinal hernia in female patient

underlying transversalis fascia should be incorporated in the running stitch, this probably helps to improve the repair

When the repair is completed the internal ring should be large enough to admit the tip of the fifth finger only It may appear rather too tight at the time, but this size is sufficient to allow the passage of the cord and its vessels Care is necessary so that the back of the inguinal ligament is not penetrated too deeply as the main vessels lie directly beneath Having seen the external iliac vein perforated by a large fascia needle on one occasion by a house surgeon, the extent of the massive hæmorrhage which may occur as a result of this accident is appreciated It was necessary to ligate the large vein above and below the damaged area to arrest the hæmorrhage The patient suffered no apparent sequelæ following this unfortunate accident The leg did not become swollen The risk should be pointed out to junior doctors when they are learning the technique of fascia repairs

The repair of the external oblique muscle aponeurosis has usually been undertaken with catgut, though an insoluble stitch at the point of arch of the external ring might be better A layer of catgut sutures should be used to close the superficial fascial layers so approximating the deep layers of the wound before skin closure A much better wound is produced if the fascial layers are approximated carefully The skin is usually closed by two monofilament nylon sutures and three Michel clips

At one stage kangaroo tendon sutures were used for repair of the inguinal canal and they were found to give very good results The heavy calibre material was rather too heavy and on occasions patients complained of feeling the knot underneath the skin after operation The light grade material is very good, being strong enough and easy to work with

In a straightforward case of inguinal hernia operation—a 3½ in incision only is made in adults—only in very large hernias is a longer wound desirable Long wounds should be avoided when possible because of the tendency to keloid formation in patients with a dark complexion Interrupted sutures are more suitable for closure of wounds in many patients in the tropics than continuous sutures The character of the skin and the nature of the underlying fat make it much more difficult to get accurate apposition of skin edges in African patients than in European patients

In recent years floss nylon has been used extensively instead of fascia lata as the material became available in about 1953 The material, made of multiple, very fine untwisted nylon fibres, is particularly strong and very soft to handle It seems to be entirely non irritant and the patients are very comfortable following its use The results are as good as those achieved using fascia lata and the material is freely available The use of this material saves the secondary minor operation on the leg as when fascia lata is used Floss nylon is very inexpensive considering its value

In direct inguinal hernia the neck of the sac is often very wide and the hernia [illegible]

hernia should be reduced *en masse* and the muscular defect closed with floss nylon

In countries where urethral stricture is not uncommonly seen it is desirable to exercise care to exclude such a condition before undertaking a hernia operation It is well worth asking patients as a routine if they have any difficulty in passing water If a patient with urethral stricture is operated upon for inguinal hernia without recognising the presence of the condition before operation, retention of urine is very likely to develop following operation It may be very difficult in such cases to pass urethral sounds after operation, and it may become necessary to make a temporary suprapubic cystotomy to relieve the retention of urine If a patient gives a history of difficulty in passing urine the matter should be investigated before hernia operation is undertaken

Many of the enormous herniæ seen in tropical countries are the result of neglect for many years One patient operated upon for strangulated hernia at the age of 75 years had had the hernia since the age of 25—fifty years duration This patient being a notoriety in the town, much ado was made about the urgency of the operation when the strangulation did occur He made a satisfactory recovery



Fig 41
Bilateral inguinal herniæ and left femoral hernia in male patient

If a hernia is not reducible before operation, much greater difficulty may be anticipated in dealing with the condition In most of these cases inflammation has occurred within the sac and a mass of omentum becomes adherent to the inner aspect of this structure, there is, in addition, often much inflammation in the superficial tissues about the area of the hernia also It is frequently difficult to separate the sac in these cases In many elderly patients suffering from painful herniæ which are reducible, but where the patient is in poor general condition, the practice has been adopted of opening the inguinal area under local anæsthesia Having isolated the neck of the sac this is tied off with thick thread after separating it from the main part of the sac, and the wound is closed in layers without any repair of the inguinal canal Ligature of the neck of the sac after section is usually sufficient to make old people comfortable and is the minimum risk and strain on elderly patients in their advanced age The risk of removing a large sac in an aged patient in poor condition may be considerable, it is better left alone This procedure is not suitable for younger men who are still living an active life

On visiting country stations doctors have commented on the difficulty of understanding the exact nature of a sliding hernia, not having seen these cases in some instances before going to work in the tropics A request has been received for a short commentary on the subject in this book In order to save a

Intramural hernia (Fig 40) is seen much more frequently in the tropics than in Europe Some cases have been sent to the surgical department where doctors have attempted an operation for this condition but have failed to find the sac In most cases the incision was placed too high up, being directly over the prominence of the hernial bulge It should be remembered that an inguinal intramural hernia is still an inguinal hernia and should be approached as for ordinary inguinal hernia The sac turns up after leaving the internal inguinal ring between the internal oblique muscle and the transversalis muscle in many cases and in some between the internal and the external obliques In some of the cases seen and previously operated upon without success, the difficulty arose because the hernial sac was looked for between the external and the internal oblique muscles when it was, in fact, at a deeper level between the internal oblique muscle and the transversalis muscle In these cases the essential is to find the neck of the sac, and the main mass of the sac can be pulled down, in the same way as in a femoral hernia it can be pulled up, using the upper approach of the Lothiesen operation After withdrawing the sac present the size of the internal inguinal ring should be reduced as for the ordinary standard oblique inguinal herniæ

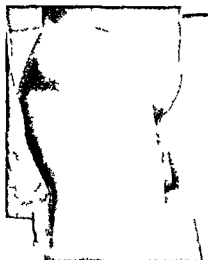


Fig 40
Intramural inguinal hernia seen from lateral aspect

No cases of obturator herniæ have been noted in indigenous patients in the tropics though they no doubt occur occasionally Those seen have all been in elderly Syrian women resident in the tropics Signs of intestinal obstruction accompanied by severe pains down the inner side of the thigh on the affected side is typical of the condition This sign was noted in all cases A small piece of small intestine was caught in the obturator foramen in each case In none of the cases had gangrene of the gut occurred A laparotomy was performed in each case

Multiple herniæ are not infrequently seen in the tropics Fig 41 shows a male *patient with bilateral inguinal herniæ and left femoral hernia in addition* In this case the left inguinal hernia and left femoral hernia were dealt with at one operation and the right inguinal hernia operated upon some months later A considerable number of patients are sent to surgical departments in the tropics suffering from hernia who, in addition, suffer from several other conditions in an advanced stage Pulmonary tuberculosis, prostatic and urethral obstruction and rectal prolapse are not infrequently noted Unless considerable caution is exercised in the selection of cases, the mortality rate will obviously be very high Many patients attribute their multiple ills to the presence of inguinal hernia when, in fact, the hernia is partly due to the many ills

The problem not infrequently arises of how to deal with the hernia which has become so large that its massive contents *cannot be reduced back* into the abdominal cavity, which they have long since left The largest hernia ever seen and operated upon was in a small boy aged 12 years from Liberia who was sent *for operation* because of a hernia which had been increasing in size from the age of 3 years The hernia when seen at the surgical department was down to the child's right ankle-joint level The patient was a very nice child, and although in hospital for five months he left quite well after an extensive operation This is the only case in which even the spleen was found in the hernial sac, the case was quite exceptional

Five suggestions are given which may help in dealing with massive herniæ where the abdomen is apparently not large enough to contain the contents and so allow *of reduction It is necessary by some means* to stretch the abdominal cavity if at all possible First, it may be possible to stretch the abdominal cavity greatly by nursing the patient in the high Trendelenburg position for several weeks This method is rather unpleasant for the patient, but patients are usually willing to stand it if given some sedatives By this means gravity assists in slowly returning the abdominal contents to the normal situation Many very large herniæ, initially apparently quite irreducible, can be reduced thus after about three weeks A second very effective method of increasing the size of the abdominal cavity is by *inducing a pneumoperitoneum and maintaining this for two to three weeks* The initial fill of air, introduced with a lumbar puncture needle, should be about 2 litres, subsequent fills twice a week should be up to 5 litres for an adult male patient The amount introduced can be regulated somewhat by the patient's feelings When sufficient air is introduced the patient will feel distended and complain of slight difficulty in breathing, at this stage the air admission should be stopped This feeling of discomfort soon passes off The method was introduced by Goni Morenco,[93] working in Buenos Aires Koontz and Graves[94] reported a series of cases of gigantic herniæ treated satisfactorily in this manner initially If it is found when operating on a very large hernia that the contents of the hernial sac cannot be returned to the abdominal cavity, great assistance may *be afforded if a phrenic nerve crush is* undertaken on the left side of the neck This secondary operation takes only a short time to perform and greatly increases the capacity of the abdominal cavity by causing the diaphragm to rise on the left *side and remain inactive The nerve recovers in due course Following* operation in these cases where there is difficulty in returning contents back into the abdomen, it is desirable to use an intestinal tube following operation for forty eight hours to help to remove gas and intestinal secretions Dealing with very large herniæ unavoidably necessitates much handling of the bowel and post operative distension is likely to occur Before any operation is undertaken on any very massive hernia it is desirable to clear the bowels as fully as possible and take the patient off solid food for twenty-four hours before operation Fluids only are allowed If the intra-abdominal pressure rises too high following operation, it may be highly dangerous due to excessive pressure on the major abdominal veins

A fourth suggestion which may help in dealing with irreducible abdominal contents in a hernial *sac is to make a long vertical* incision in the anterior sheath

lot of description, line drawings are being presented of the various form of herniæ (Fig 42) In the diagrams it will be seen that in sliding herniæ No 4 the inguinal ring is invariably of very large size The cæcum, which is partly an extraperitoneal structure, slides down on the posterior abdominal wall through the posterior aspect

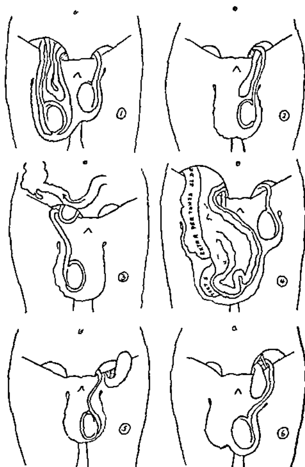


Fig 42
Diagram illustrating various types of inguinal and femoral herniæ

of the inguinal canal to the pre-pubic area and on to the upper part of the muscles of the medial aspect of the thigh before it enters the scrotum There is a hernial sac in front of it but the cæcum is outside the hernial sac Fig 43 shows the type of case which is causing great difficulty, a large sliding hernia being present and a large hydrocele *in addition* The large scrotal herniæ seen in the tropics are virtually never seen in temperate climates, they therefore become a feature of surgical work in the tropics

The testicle usually has sufficient anastomotic blood supply to prevent necrosis and sloughing The procedure is followed by fairly marked temporary swelling in the scrotum but in most cases gangrene of the testicle does not occur Atrophy of the testicle occurs following this procedure, but the testicle being in most cases already much above normal in size this does not matter very much The residual mass is usually as large or even larger than a normal testicle The inguinal canal is completely closed The use of antibiotic drugs is not encouraged when operations are being undertaken on medium or small herniæ, but where extensive procedures are undertaken it is advisable to give antibiotics If a very large sliding hernia has to be operated upon, a blood transfusion should be given during or immediately after the operation Floss nylon, using interrupted sutures, is considered the most suitable material and method of closing the inguinal canal where a strong permanent obliteration of the canal is essential for cure

Lumbar hernia of the triangle of Petit is seen more frequently in the tropics than in temperate climates The condition is usually recognised incidentally when a chest is being examined, but patients seldom complain of the condition No patient has requested operation for this abnormality Repair of the muscle defect after reduction of the hernia is all that is likely to be required

Umbilical hernia is commonly seen in Africa where there are inadequate maternity services The condition appears to be directly related to the occurrence of umbilical sepsis rather than any inherent tendency in African patients to develop this condition During the past twenty years there has been a marked decrease in the condition in areas where maternity services have been developed If the condition were due to some inborn error in African subjects, as has been suggested by some observers, there would be no tendency for the condition to become less frequent than twenty years ago, which undoubtedly is the case If umbilical hernia is noted in early childhood, it is desirable to treat the condition conservatively for one year at least An elastic abdominal belt stitched to the correct size is much more satisfactory than trying to strap pennies over the umbilicus If coins or discs are held in position by elastoplast the child's skin becomes sore by repeated applications, and so this method is unsuitable for use over a long period A 4 in elastic belt right round the child is considered much more practical This form of belt can easily be made to fit the baby and be pulled on from below upwards

Patients may complain of upper abdominal pain and attribute it to an umbilical hernia When this is noted in the tropics in adult patients it is advisable to investigate the patient for ascaris-worm infection In a high proportion of the cases the patient's ascariasis is found to be present The pain associated with ascariasis infections is usually about the umbilicus and not in the epigastrium Strangulation of umbilical hernia in fat elderly women is not very uncommon, a small piece of intestine being caught in a pocket in an adherent mass of omentum within the hernial sac In operating on umbilical hernia, the peritoneum must be carefully separated from the under surface of the aponeurotic ring present On opening the sac, the adhesions of omentum must be separated from the sac In many cases it is desirable to remove a mass of omentum, as otherwise, being inflamed, it is very liable to become adherent to other structures after release and

of the rectus muscle this allows of a slight anterior bulge of the abdominal wall and gives some assistance by affording more space in the abdominal cavity It has the disadvantage of necessitating a long extra incision on the abdominal wall this may be justifiable in difficult circumstances The fifth suggestion in dealing with these difficult irreducible cases is the obvious idea of removing a large portion of bowel and undertaking an intestinal anastomosis This method is usually considered a dangerous practice It has been undertaken on several occasions with satisfaction and without mishap The essential is to anticipate that it may be needed and to have the patient prepared appropriately clearing the bowel and giving a course of sulpha guanadine for four days before operation This method was adopted





FIG 43 FIG 44

Fig 43 —Massive sliding hernia with hydrocele before operation
Fig 44 —Same case as Fig 43 following operation

in the case of the patient shown in Figs 43 and 44 The photographs were taken before and after operation A right orchidectomy was performed at the same time The inguinal canal was then closed completely

In patients with large sliding herniæ the vessels of the spermatic cord are often of enormous size and there may be difficulty in closing the inguinal canal sufficiently to prevent a recurrence of the hernia and yet allow sufficient space for the entrance of the cord structures One alternative is to remove the testicle on the affected side and close the canal completely This may cause a marked increase in the operating time and further loss of blood for the patient who may be already in poor condition In these cases the cord may be cut across and the testicle left in position Following cord section the canal can be closed completely

for the drainage tube rather than bring it out through the lower part of the primary wound

No cases of diaphragmatic hernia have been recognised in so far as patients in the tropics are concerned The lesser tendency to vomit of patients seen in tropical practice may account to some extent for the condition not being recognised The necessary X-ray technique for recognition of the condition has seldom been undertaken

A large number of very rare herniæ are described, but they are of little practical importance They occur in positions which are not easy to detect on examination, such as through gaps in the pelvic floor They are usually found at laparotomy in the same way as internal herniæ into peritoneal recesses are discovered

The symptoms produced by internal herniæ are the same as those of band obstruction With internal hernia there is seldom any history of an antecedent abdominal attack of any sort, as is usual in the case of band obstruction, where there is almost invariably a history of some abdominal trouble six months or a year previously, or a previous operation having been performed There appears to be no easy way of determining the site of the internal hernia In any intestinal obstruction of the mechanical type the maximum intensity of the obstructive bowel sounds tends to be over the site of the obstruction, this may be of some help in arriving at a correct conclusion in some cases In any cases where doubt exists, before operation of the site on an obstructive lesion, a midline subumbilical incision is much the most useful In my own experience intestinal obstruction is in 80 per cent of the cases below the level of the umbilicus

In patients fit enough to stand operation for hernia, surgery is the best form of treatment In a limited number of elderly and infirm patients a truss may be worn If a baby with a large inguinal hernia requires operation, but is in poor condition, a wool truss may be a temporary help A skein of wool is placed round the baby's body and one end put through the loop of the other end, after tightening, the junction is then placed over the position of the hernia and the residual tail of the skein drawn firmly under the perineum and tied at the back to the transverse bands in that position under tension This gives some support at the position required and may help until the child is fit enough for operation

Injection treatment of small reducible hernia by sclerosing of the sac has been advocated from time to time The majority of surgeons condemn the procedure It has been tried on a few occasions only The method is very time-consuming and is not encouraged, though in the few cases where it was used the results were very good It is suitable only for herniæ of the bubonocele type which do not enter the scrotum Before the area occupied by the hernial sac is injected the hernia must be completely reduced A finger is held over the inguinal canal while the injection of diluted quinine and urethane solution is being made Several injections of a few minims are made at various areas considered to be the likely site of the hernial sac The injections are given weekly for six weeks There may be some thrombosis of the vessels of the spermatic cord The object of the injections is to produce an aseptic inflammation of the sac and close it by adhesions A hernia truss must be worn continually during the period of treatment If injection treatment is not successful and an operation is considered necessary later, it

possibly give rise to band obstruction It is wise to use thread ligatures for tying off mesenteric vessels in the omentum rather than catgut, as they are much less likely to slip Floss nylon repair of umbilical hernia gives a very satisfactory result, *the material being of a strong yet soft texture*

In many cases of umbilical hernia there is a small para umbilical hernia present in addition It is advisable to repair this defect at the same time as it can be done through the same incision Figs 45 and 46 show a small boy who had such an operation undertaken The symptoms attributed to the umbilical hernia may be, in fact, due to the smaller para-umbilical hernia For this reason the two should be operated upon It is considered desirable to give penicillin following operations



FIG 45



FIG 46

Fig 45 —Umbilical hernia with para umbilical hernia in addition
Fig 46 —Same case as Fig 45 following operation

for all umbilical herniæ For some reason there is a marked tendency for these cases to become infected, much more so than in the case of inguinal hernia If the case becomes infected where insoluble repair material has been used for the repair the sepsis does not settle down easily, and it may necessitate removing some of the repair material which is detrimental to the ultimate success of the case

Certain types of operation incision are very liable to be followed by incisional herniæ This is not infrequently noted in incisions following kidney operations Kidney operations are not nearly so commonly required in tropical practice as when dealing with patients in Europe Particular care is necessary in cases where the incision used is known to be liable to post-operative incisional hernia In order to decrease the risk of incisional hernia in septic abdominal cases where drainage is considered necessary, it is advisable to make a separate incision

circumstances, contents other than gut and omentum may be seen Reid,[95] working in West Africa, reported an unusual strangulated hernia case where the large sac of an inguinal hernia in a female patient contained a loop of gangrenous gut but in addition the uterus, both Fallopian tubes and both ovaries The patient died, and at post-mortem examination the nature of the condition was confirmed The strangulated uterus contained a three months' pregnancy Such extraordinary cases are seldom seen in temperate climates, yet junior medical officers in charge of country stations are expected to be able to deal with all forms of emergency cases which may be brought for treatment

Strangulated herniæ may be seen at an early or a late stage If a strangulated hernia is not treated surgically, about 95 per cent of the patients die, but not all In approximately 5 per cent of cases a fæcal fistula develops and the patient recovers A small number of cases of fæcal fistula following broken-down inguinal herniæ are seen annually, usually one or two per year With small, tight, strangulated herniæ of the Richter type, gangrene may occur at the area of constriction within six to eight hours of the onset of strangulation All small, tight, inguinal hernia should therefore be operated upon immediately or very soon after admission to hospital

From observation of scrotal herniæ of various sizes over many years it has been noted that during the first twenty-four hours gangrene seldom occurs If an inguinal hernia proceeds as far as the scrotum the inguinal ring is usually not of a very small size The gut is viable in almost all these cases and a gut resection is very seldom required in these " first day cases " Gut resection is not required in more than 5 per cent of the cases treated surgically within the first twenty-four hours During the second day the gut becomes non-viable in most instances and gut resection is necessary in about 50 per cent of the cases If cases are seen for the first time on the third day, bowel gangrene in about 90 per cent of the cases and practically all cases require resection The patient by the third day is extremely ill If cases are seen initially on the fourth day there is almost invariably *evidence* that the bowel has ruptured into the superficial tissues and *marked swelling and* œdema is present *in the skin and subcutaneous layers* In some cases the swelling has broken down by the fourth day and the mass has commenced to discharge The majority of untreated patients suffering from strangulated hernia die on the fourth day with peritonitis and dehydration A small number of patients seen for the first time on the fifth day have a serohæmorrhagic discharge from the surface of the site over the hernia with evidence of a fæcal discharge being present If a fæcal fistula occurs the patient may recover In most of the cases where the patient develops a fæcal fistula and recovers, the hernia is of the Richter type The obstruction in these cases is not quite complete *If the hernia enters the scrotum the obstruction is complete in most cases and a very small number recover with this variety even though a fæcal fistula does develop* The prognosis is very bad *In patients* who develop a fæcal fistula as a result of a Richter hernia which has strangulated and broken down, motions are passed per rectum in addition to the fæcal loss through the fistula Obviously there is not a complete intestinal obstruc [illegible] ry uncommon to find a patient giving [illegible] fæcal fistula) resulted from an

may be very difficult, due to the irregular sclerosis produced by the injection Injection treatment is therefore not encouraged on rare occasions and in special circumstances it may be useful

The use of whole-skin inlays has not been attempted The disadvantages reported seem to outweigh the advantages In the absence of personal experience with the method no criticism can be offered on the subject

ABDOMINAL HERNIÆ STRANGULATED

Strangulated inguinal hernia is the commonest cause of intestinal obstruction in male patients in most parts of the world Umbilical and femoral herniæ give rise to intestinal obstruction much less frequently Both inguinal and femoral herniæ are more commonly seen in male than female patients Umbilical hernia is more common in female patients, but it is not a very common cause of intestinal obstruction Because of the intestinal obstruction produced by strangulated hernia the condition is a most serious emergency, requiring prompt treatment This group of cases of intestinal obstruction is one of the most serious which medical officers are called upon to deal with In many country stations herniæ of various sorts constitute the largest group of surgical patients admitted A fair proportion of hernia cases are admitted in a strangulated condition The youngest patient seen with a strangulated hernia was 5 days old and the oldest, a man of 90 years In most of the large towns in the tropics fractures and cases of wounding exceed the number of hernia cases, but this is not the case in most country hospitals

If a non-strangulated hernia of any sort which has been present for many months or years suddenly becomes painful, irreducible and associated with vomiting, it can be concluded that strangulation has occurred If strangulation occurs in a hernia some form of active treatment must be undertaken In some cases omentum only is found in a strangulated hernia In none of the cases of umbilical hernia seen has gangrene of the bowel been noted In the case of inguinal and femoral herniæ, where a small hernial ring is present, gangrene of the bowel is liable to occur at an early stage and early operation is indicated in all such cases In a Richter type of hernia, usually of the inguinal variety, where part of the lumen of the bowel is caught in the hernial orifice, early gangrene is very liable to occur Richter s hernia gives rise to a small groin swelling, not larger than the size of a hen's egg hard-boiled and cut across the middle The swelling remains over the inguinal ring and does not encroach on the scrotum The condition is invariably very painful Small herniæ of this character should be operated upon in all cases as soon as possible after being seen

In most patients seen with strangulated hernia the condition has been present in the non-strangulated state for months or years The fact that the mass could be reduced back into the abdominal cavity by the patient without difficulty is usually the reason why treatment has been neglected until strangulation occurred Small intestine is the commonest content of inguinal and femoral herniæ, omentum may be present in addition in some cases

In many tropical countries herniæ are neglected for many years and may reach enormous proportions The hernial ring becomes much stretched In these

pressure effect of gravity on the hernia as a result of the Trendelenburg position used The sedatives and flexion of the legs relaxes the spasm of abdominal muscles, and with the heat applied to the patient sleep is often induced In a high proportion of the cases seen on the first day, reduction of the hernia occurs In describing the method all cases seen in 1949 and 1951 were analysed The year 1950 was not used because of vacation leave to Europe In the 1949 series 72 per cent of the cases treated by the postural method reduced spontaneously In the 1951 series 73 per cent of the cases so treated were reduced by posture The reduction rate for the two series is almost identical The time necessary for

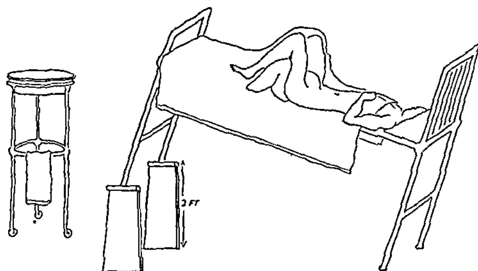


FIG 47
Postural treatment of early strangulated hernia in hospital

reduction was noted in the 1951 series and the figures are of considerable interest (Bowesman[9])

Reduction after one hour	22 per cent of cases
Reduction after three hours	33 per cent of cases
Reduction after six hours	56 per cent of cases
Reduction after eight hours	73 per cent of cases

This method, though very successful in first day cases, has given rise to some controversy The overall mortality rate for all strangulated hernia cases treated, using this method in first-day cases and immediate operation in cases after the first twenty four hours of symptoms, excluding cases of Richeter's hernia, was 4 3 per cent in the first series and 4 5 per cent in the second series These figures are more favourable than noted for any other series so far brought to notice, and suggest that the method has a place in treatment of strangulated inguinal herniæ if used in selected cases

Monro,[98] considering the technique, felt that a compromise might be made with advantage between this method and immediate operation in early cases

"abscess" which was opened four or six months before by a man in his village, the method of opening being by the application of a red-hot wire

The operative mortality rate following surgical treatment of strangulated inguinal hernia depends on the stage at which the patient is first seen The mortality rate which may be expected with average surgical skill is

Operation within first twenty-four hours	10 per cent fatality
Operation within second twenty four hours	40 per cent fatality
Operation within third twenty-four hours	75 per cent fatality
Operation within fourth twenty-four hours	90 per cent fatality
Operation within fifth twenty-four hours	95 per cent fatality

Most patients seen with strangulated inguinal hernia in the tropics arrive at hospital on the second day in country stations In patients seen in the large towns, the time of arrival is usually between eight and sixteen hours after the onset of strangulation The overall results of treatment are therefore much better in hospitals in the towns than in hospitals in the country, irrespective of the skill of the doctor in attendance

With limited experience and modest facilities in country stations where the doctor is working with no other doctor to help, the position may be very alarming In most parts of the world the standard treatment for strangulated hernia at all stages is immediate operation As a result of noting the absence of gangrene in strangulated hernia during the first day other than in cases of the Richter type of hernia, conservative treatment by *postural* means has been adopted in cases seen within sixteen hours of the onset of symptoms Bowesman [96] reports the technique of the method adopted which is suitable for early cases when undertaken *in hospital*, the method being as follows

TECHNIQUE—

1 Very high blocks under foot at end of the bed Two 2 ft blocks are needed (Fig 47)
2 Morphia, $\frac{1}{2}$ gr for adults, not $\frac{1}{4}$ gr
3 Cold compress to groin and scrotum
4 General warmth to the patient
5 Flexion of both legs at hips and knees, maintained by pillows

It is necessary to place a pillow at the top of the bed to prevent the patient's head slipping through the bars, as the Trendelenburg slope produced is very steep

In undertaking conservative treatment in patients seen on the first day, it is essential to get an accurate history as to the duration of the condition as the treatment may otherwise be undertaken in error at a later stage than is permissible The history given by the patient should be confirmed independently by the relatives of the patient Histories are notoriously inaccurate, as patients may want to conceal the delay in seeking treatment when household remedies fail at home This is a very human tendency, we all do it a bit Independent confirmation of the history by a relative not in the presence of the patient decreases the risk of a wrong history being accepted Postural treatment depends on the

beneficial, 100 mg of cortisone is useful in mobilising the intracellular potassium and has a most stimulating effect. The effect in improving a patient's condition is *clinically* very obvious, the exact mechanism of its action is not easy to understand. In the absence of adequate intracellular potassium the oxygen-carrying power of the blood is lowered.

In operating on strangulated inguinal hernia it is necessary to make a slightly larger incision than that used for non strangulated hernia. In all cases of strangulated hernia a course of streptomycin is advisable following operation, the wound being potentially infected. In most cases of strangulated hernia the strangulation is caused by *the external inguinal ring*. *In a smaller proportion* of cases the strangulation is due to a strong fibrous band in the neck of the sac. In attempting to open the external inguinal ring it will be found much easier if the constriction is approached from above rather than from below. A short incision should therefore be made in the aponeurosis of the external oblique and the ring *opened from above downwards, using a blunt-pointed pair of scissors*. This instrument is most unlikely to damage the bowel. To open the constriction from below upwards is much more difficult and rather dangerous.

In opening the external inguinal ring it is essential to avoid the strangulated bowel slipping back into the peritoneal cavity, or allowing fluid to run from the sac *in which it has been confined into the abdominal cavity*. *Before the ring is* loosened it is desirable to open the hernial sac in order to let out the fluid contained in it. This decreases the risk of fluid returning into the abdomen. The hernial sac should be opened carefully with the point of a scalpel, making a very small opening initially, the edge of the knife being directed not towards the hernia but slightly away from it, this decreases the risk of injury to the bowel. When the sac is opened some clear or slightly blood-stained fluid usually escapes from the opening made in the sac. If there is doubt as to whether the sac is opened or not, it almost invariably is not open. The blood-stained fluid in the sac should be removed if possible by a suction apparatus, otherwise with swabs. All fluid should be removed from all parts of the sac before the external ring is loosened. Even after the external oblique muscle has been divided at the apex of the ring, it may be necessary to incise the upper and outer part of the conjoined tendon in order to relax the structures at the neck of the sac. By opening the internal ring slightly at this position, damage to the deep inferior epigastric artery is avoided. If after relaxing the muscle by a small incision the bowel cannot be pulled down from the neck of the sac it is necessary to incise the neck of the sac itself. A small director is helpful at this stage in protecting the bowel while the neck of the sac is divided. This must be undertaken slowly and carefully.

The operation wound should be well towelled with hot packs before the intestine is pulled down for inspection. The loop of gut needs to be withdrawn for at least 2 in from the position of the neck of the sac for adequate inspection. If the gut is very congested and a dark reddish-purple colour is noted but with the surface still shining, it is usually viable and can be put back into the abdomen. It is desirable to keep the bowel under observation for a few minutes to see if the colour improves after the release of the pressure. If the bowel looks dull and not shining, of a greyish shade, it is usually not viable. In these cases a gut

He feels that in view of the agreed possible risk of gangrene developing at the site of constriction in a proportion of the cases, if a prolonged trial of conservative treatment is undertaken, the method might reasonably be considered for four hours, but not longer. During the four hours while postural treatment is being attempted the patient can be prepared for operation by giving intravenous fluid with electrolytes. If reduction occurs during the four hours of postural treatment an advantage is gained and immediate operation avoided. A timed operation can be undertaken later, when the local inflammation has settled down and the patient is in better condition for operation. If reduction is not achieved the patient is at least in better condition and more adequately prepared for operation after four hours. The risk of taking a patient wholly unprepared to the theatre for a surgical operation is far from negligible and is associated with a high rate of complications. The chance of reduction at four hours with postural treatment is approximately 50 per cent. Originally the method was advised for cases with symptoms of not more than sixteen hours so that with up to eight hours postural treatment the total time before operation in the event of failure should not exceed twenty-four hours. It appears fair to advise the method for four hours in cases of strangulation of under sixteen hours' duration, and if the swelling decreases during that time but reduction is not complete it can be continued for up to a maximum of eight hours. If, however, there is no apparent improvement in the condition of the hernia swelling during the first four hours then operation should be undertaken without further delay. In many cases after four hours the hernia will be found to have reduced in size and be quite soft and obviously reducing. No manual pressure should be used at any stage.

Wangensteen[99] made a valuable contribution to the problem of reducing the mortality in cases of intestinal obstruction by the pre-operative use of nasogastric suction. By this method the overall death-rate from intestinal obstruction was reduced at his clinic from 45 to 15.6 per cent. This method of pre-operative preparation is most valuable. Intravenous fluid and electrolytes should be given to replace those lost from the circulation into the intestinal tract by exudation. With intestinal obstruction there is usually a raised intraluminal pressure in the gut. This interferes with the venous drainage of the intestine as a result of pressure on the veins. There is a marked increase of secretion into the intestine, as can easily be seen at operation. In this way blood protein and salts are lost. A patient's condition deteriorates rapidly as a result of this upset in his physiology. Intravenous 1 per cent. solution of sodium chloride improves the patient's general *condition*. *Rapid replacement* of the patient's sodium chloride by intravenous injection is easy and efficient. An initial dose of 20 c.c. of 10 per cent. sodium chloride may be given intravenously with advantage. This can be followed by the use of intravenous 1 per cent. solution of sodium chloride, fluids being required also. A patient does not improve nearly so markedly if sodium chloride alone is given without the addition of potassium salts. Potassium is also required in cases of intestinal obstruction. The potassium requirements are about one-sixth of those of sodium chloride. The addition of 2 gm. potassium chloride to the litre of normal saline is beneficial and approximately the amount needed per litre of normal saline. The additional use of cortisone is found to be

blood-pressure This drop in the blood-pressure may cause marked shock and is sometimes fatal This fall in blood-pressure is best combated by a blood transfusion A two-hourly dose of an antihistamine drug is also helpful, for four doses Cortisone also, four-hourly, is beneficial, four doses should be given, 100 mg six-hourly The general principles of dealing with other forms of strangulated hernia are similar to those operative methods used for strangulated inguinal hernia Strangulation of internal herniæ are more comparable to cases of band obstruction The relief of the band obstruction is seldom enough by itself and in a high proportion of the cases a gut resection is required

Femoral or umbilical herniæ are not treated conservatively by postural methods If a patient is seen for the first time on the fourth or the fifth day following the



Fig 48

Fæcal fistula for very late strangulated inguinal hernia case

onset of symptoms of strangulated inguinal hernia, he will almost certainly not be fit for operation The fitness for operation can be judged most accurately by a measure of the systolic blood pressure and the character of the patient's pulse If it is obvious that gangrene has already occurred, as indicated by the œdema of the local tissues of the scrotum over the hernia, it is justifiable to puncture the mass in very late cases in bad condition with a view to forming a fæcal fistula (Fig 48) This is the natural outcome of untreated strangulated inguinal hernia if the patient does not die by the fourth day, and as the patient is seldom fit at that stage for active surgery the natural process may be accelerated with advantage. If a fistula forms, the patient in a small number of cases may recover If on opening the gangrenous bowel in the hernia, fæces do not come away, an attempt to pass a silver probe into the lumen of the bowel should be made If the gut can be entered it may be possible to pass a rubber catheter into the proximal part of the gut If a fæcal fistula is successfully produced, the patient should be

resection is necessary The state of the mesenteric blood-vessels should also be inspected In removing damaged gut it is advisable to give a margin of not less than 2 in on each side of the damaged bowel positions If 1 in only is allowed beyond the damaged constricted area the colour of the bowel may be satisfactory, but the gut so close to the constriction is very liable to be œdematous, and the anastomosis may give way because of the unhealthy state of the gut even though the method of suture is correct As there is ample bowel available, it is worth running no risks

For those with limited experience of gut resection and anastomosis it will be found much easier when undertaking this procedure to divide the mesenteric vessels between individual pairs of forceps before the intestinal clamps are applied If the forceps are applied at an early stage, they get in the way somewhat and are liable to be pulled upon inadvertently and may even cause an accident to the unhealthy bowel If not applied until the mesentery is tied off the procedure will be found easier It is advisable to tie off mesenteric blood vessels with medium calibre thread rather than catgut, which is much more liable to slip Thread gets a very secure grip and seldom allows any slipping It can be very disconcerting if a ligature slips and severe hæmorrhage has to be arrested

After application of four clamps the bowel should be cut across, using scissors The open ends need to be swabbed carefully by an assistant to decrease the risk of contamination of the other tissues locally An end to-end anastomosis should then be undertaken Atraumatic needles are most suitable for this purpose, but if not available in country stations an anastomosis can be undertaken, using cotton thread on non-cutting needles Bowel anastomosis should be in two layers The suture lines should be of the continuous type The performance of an anastomosis will be found easier if a holding stitch is put into the two pieces of gut at opposite ends to hold the two tubes of gut in a series of parallel edges, this makes the stitching much easier and sutures are therefore inserted more accurately A few sutures are required in the edges of the mesentery to prevent a hole being left through which a piece of small gut could subsequently penetrate and become obstructed

After replacement of the repaired bowel back into the abdominal cavity the hernial sac should be dissected out from the scrotal tissues and structures of the cord After ligature of the neck of the sac the canal should be repaired Three insoluble sutures only are advised, the minimum of suture material should be used consistent with closing the gap The danger of insoluble material becoming infected in these cases is that the sutures may work out Additional catgut sutures can be used if it is considered necessary to reinforce the repair If adequate streptomycin is given, the wound frequently heals without apparent sepsis The external oblique muscle is closed with catgut No sutures are put in the superficial fascial layers and the wound is not closed tightly, three or four monofilament nylon sutures only being used in the approximation of the skin No drainage tube is used If the wound is not closed too tightly, drainage occurs between the sutures

Following operations for strangulated hernia, whether resection of gut has been undertaken or not, there is frequently a marked temporary drop in the patient s

traumatic, occurs at some point followed by the formation of a local abscess The abscess ruptures to the surface or into another hollow structure or channel, thus forming a fæcal fistula With internal fæcal fistula the communication with the bowel is usually into another portion of the bowel or into the urinary tract at some point A vesicocolic fistula is not very unusual

Fistula formation may be Nature's method of relieving intestinal obstruction, for this reason not all patients with intestinal obstruction die A small proportion form fæcal fistula and live The method of fistula formation is used at times in surgery as a timed procedure Gastro-enterostomy for pyloric obstruction is a calculated internal fæcal fistula produced by surgery An ileotransverse colostomy may be used as a preliminary in treatment of obstructive lesions of the colon An intercolonic transverse-sigmoid junction is used as a by-pass mechanism in cases of irreducible intercolonic intussusception Gastrostomy and cæcostomy are also designed fæcal fistulæ A uretero-colonic anastomosis may also be classed as a type of calculated internal fæcal fistula, though the object is the drainage of urine into the colon rather than contents in the opposite direction Fæcal fistula may occasionally follow accidental trauma of the intestinal tract by stab wounds, bullet wounds and fractures of the pelvis injuring the rectum The various forms of calculated surgically constructed fæcal fistulæ need not be discussed here It is, however, important to consider the accidental traumatic fæcal fistulæ resulting from surgical procedures There is a large group of fæcal fistulæ which may be produced as a result of neglected inflammatory conditions affecting the intestinal tract

Considering first fæcal fistulæ from the umbilicus, it is not uncommon to note this congenital abnormality soon after the inspissated umbilical cord leaves the navel In these cases the omphalomesenteric duct has never closed properly In some instances there is a thin layer of skin over a Meckel's diverticulum attached at the back of the umbilicus In these cases nothing abnormal may be initially noted Some months or years later the thin skin membrane breaks down and a fæcal fistula is formed Wolf[100] reported a case where the skin of the umbilicus broke down in a child aged 4 years and ascaris worms were extruded through the umbilicus

Patients with patent omphalomesenteric duct are usually brought to hospital for treatment between the ages of 2 and 5 years In some cases only a minute communication exists and the condition gives rise to little trouble Fig 49 shows a case of this type, the child being about 2 years old The condition was dealt with by complete excision of the track A T-shaped piece of bowel representing the Meckel s diverticulum present and a 1 in portion of ileum on each side of the position where the diverticulum was attached were removed The bowel was reconstituted by anastomosis The baby made an uneventful recovery It should be remembered in these cases that any operation involving an umbilical abnormality may be of a major nature In some cases there is not only an abnormality involving the small intestine but also the apex of the bladder Great care must be exercised in entering the abdomen for this reason Any attempt at local operation on the umbilical area for closure of this type of fistula is not likely to be successful A fistula must be excised completely and the normal tissues joined If a local closure of a fistula is attempted in any part of the body, the general principle is that a

kept under close observation to see if his condition improves If his general state improves further, operation should be deferred temporarily

It is not unusual to find that following the production of a fæcal fistula the patient improves for about a week and then his condition begins to deteriorate again If a secondary deterioration is noted following the initial improvement, in spite of all supportive measures, operation should be undertaken as soon as possible The abdominal incision should be placed rather higher than the usual hernial incision A fairly wide incision is necessary in these cases The simplest procedure is to undertake a side-to side anastomosis of the gut above and below the hernia area and close the abdomen This relieves the situation and allows intestinal contents to pass to the distal bowel It is not advisable to disturb the bowel entering into the hernial constriction at this stage The minimum of surgery is all that is permissible in such cases If the patient recovers, a systematic reconstruction operation of the bowel can be undertaken some months later, with removal of the portions entering the hernial constriction

Spinal anæsthesia is suitable for operations on patients suffering from early strangulated hernia Relaxation is good with spinal anæsthesia, and following operation the bowels frequently move, which is beneficial in cases where the gut is viable If cases are seen after the first day, general anæsthesia is more suitable than spinal anæsthesia because of the lowered blood-pressure which occurs when the patient is in poor condition Local anæsthesia has only a limited use in very late cases

FÆCAL FISTULÆ SIGNIFICANCE AND TREATMENT

A fæcal fistula is an abnormal communication between any part of the intestinal tract and the surface of the body, or between the intestinal tract and any other epithelial lined channel or cavity Fæcal fistulæ are therefore of the external or internal type The abnormal congenital communications from various parts of the intestinal tract between the mouth and the diaphragm are not usually classed as fæcal fistulæ, though they are essentially of the same nature Cleft palate, branchial fistula, œsophageal pouch fistula and œsophago-tracheal fistula are those most commonly seen above the diaphragm They will not be considered here

Congenital fæcal fistulæ below the diaphragm, from which there is an obvious flow of fæcal contents in newborn infants, range from omphalomesenteric duct to the various forms of recto-urogenital fistulæ associated with imperforate anus The latter group have already been considered Fæcal fistulæ of all varieties are seen more commonly in the less-developed areas of the world than in areas where hospital services are more advanced The reason for this is that in the acquired type of fæcal fistula the condition is the result of neglected inflammatory conditions associated with the intestinal tract, the patients coming to hospital at a very late stage

The two basic factors associated with fistula formation of any sort are, in the non-congenital types, perforation of the gut wall at some point and the presence of some obstruction beyond this area Bowel necrosis, inflammatory or

If operation is anticipated in any fæcal fistula case, the bowel should be sterilised beforehand by a course of sulfasuxidine Streptomycin is the most suitable antibiotic for use following operation in a potentially infected field involving the intestinal tract

Considering the pathological fæcal fistula group it is noted that the condition is most commonly seen following strangulated inguinal hernia of the Richter's type A fistula from this cause is invariably situated close to the inguinal ring In these cases the prognosis is comparatively good The intestinal obstruction is not complete If the fistula is in the upper part of the scrotum it can be concluded that a total intestinal obstruction has occurred due to a loop of bowel coming through the external inguinal ring The low type of fæcal fistula of inguinal type is seen less commonly than the higher type If a total obstruction occurs the patient usually dies if not relieved by surgery Patients with the high type of inguinal fæcal fistula often come to hospital about four to six months after the original strangulation of a Richter's hernia occurred They have got over the initial illness and they are usually in very good general condition Attempts at local repair of inguinal fæcal fistula are entirely unsatisfactory Following attempts at local repair, which failed on four or five occasions, the method was then given up These remarks may save others doing the same Nothing less than a planned operation for complete removal of the involved loop of bowel is satisfactory as a method of permanent cure If the patient is fit for such an operation this should be undertaken If the patient's condition is poor, no more than the minimum of surgery should be undertaken to relieve the intestinal partial obstruction by side-to-side anastomosis

Inguinal fæcal fistula following a strangulated Richter's hernia should be operated upon through a rather high inguinal incision This incision keeps well away from the discharging area A section of bowel should be removed not less than 12 in in length The object of removing a comparatively long section is that by removing a piece of this length the clamps can be applied outside the abdomen and the resection can be undertaken much more safely The loss of 12 in of small intestine is not more serious than a loss of 6 in If an attempt is made to apply clamps to the bowel inside the abdomen they are very liable to become displaced and the abdomen may become contaminated By accidentally knocking a clamp inside the abdomen the damaged intestine may be pulled off at the site of its attachment inside the inguinal ring, and this is liable to cause a sudden uncontrollable leakage of intestinal contents within the peritoneal cavity, which would be most serious To undertake the resection and anastomosis outside the abdominal wall is recommended

After resection and anastomosis the reconstructed bowel is replaced within the abdomen The residual bowel involved in the fistula is then dealt with The area needs to be well packed off with damp hot packs to prevent soiling To avoid a leak of fæces close to the position of the fistula, a curved cholecystectomy forceps should be put on at both sides of the gut close to the fistula The mass is then drawn up, separating it from the inside of the inguinal area, using a small damp swab held in an artery forceps After removal of the gut a swab is placed in the inguinal area inside the abdomen to absorb the small amount of blood which

three-layer repair is necessary Repair of the internal mucous membrane, the middle layer repair of fascia or muscle as the case may be, and a surface skin closure is required It is much more practical where two flat surfaces have a communicating track between them to excise the abnormality complete if possible

Many cases have been noted where difficulty has arisen in diagnosing a fæcal fistula The diagnosis is usually not difficult X ray examination may help if apparatus is available, but much the easiest way in country stations is primarily to get a good history from the patient, asking if any difference is noted when a lot of water is taken to drink Patients with fæcal fistula almost invariably notice that the discharge from a fæcal fistula is very much more profuse when they drink



Fig 49
Congenital umbilical fæcal fistula

a lot of water Some fistulæ of the very narrow calibre variety let very little fæcal matter pass and seem to discharge only a little sticky fluid This may be due to the angle at which they come off the bowel In these cases the discharge becomes profuse when much water is taken by mouth This point is simple but very important in diagnosis One of the most practical methods of diagnosis suitable in any part of the world is to give the patient a teaspoonful of powdered charcoal in water or milk to drink This should be followed half an hour later with a saline aperient Patients usually notice that the discharge from a fistula is more marked following an attack of diarrhœa or after taking a saline aperient This information may be used to advantage in diagnosis If a fistula is present the charcoal particles can invariably be found on the dressings over the suspected discharging area within twenty-four hours Patients may suspect a fæcal fistula themselves in some cases, noticing particles of identifiable food, such as tomato skin, passed through the fistula soon after being eaten

of the terminal ileum there may be great difficulty in getting the fistula to close. It does not tend to close spontaneously because of the slight obstructive action of the ileocæcal valve If a chronic fæcal fistula of the appendix area is seen, the case should be investigated for any condition which may be giving rise to obstruction in the large bowel Schistosomiasis, amœbiasis, actinomycosis and tuberculosis should be considered Stool specimens need to be examined and a sigmoidoscopic examination undertaken Sigmoidoscopic biopsy should be employed if the appearances suggest any pathological lesion in the areas examined Amœbic dysentery may be detected from mucus removed by scoop or on swabs Biopsy of the granulation tissue in the wall of the fistula may also be helpful, particularly in cases of a tuberculous nature Actinomycosis and fungoid conditions may also be detected in this way Pathological changes in the cæcum may give rise to symptoms very like those of appendicitis In these cases the appendix may be removed, the true nature of the cæcal condition being discovered at operation or following investigation of a residual fæcal fistula some time later

Appendicular fæcal fistula has been noted on a few occasions occurring in the lumbar triangle of Petit This occurs more commonly in patients with a high cæcum and an appendix in the retrocæcal position, the tip of the appendix in these cases being almost precisely over the inside of the lumbar triangle This high position of the cæcum is not commonly seen in Europe, it is much more common in African patients The pain, tenderness and fluctuant abscess over the iliolumbar area may be suggestive of a perinephric abscess If, following the discharge of pus, fæcal material is subsequently noted coming from the wound in this area, it can be concluded with fair certainty that the abscess present was due to a ruptured retrocæcal appendix There may be very little fæcal material present in the discharge and a sinus secondary to spinal bone disease may be suspected Lipiodol X-ray investigation is not necessarily very helpful in these cases One or more irregular tracks may be noted, and it is seldom apparent what is the true basis of the essential pathology when using this method Much the easiest procedure is to give the patient a spoonful of charcoal with plenty of fluid to drink, and follow this with a saline aperient as previously suggested for other forms of fistula

The presence of specks of charcoal on the white swab dressings invariably indicates the nature of the condition within twenty-four hours This method is more helpful than X-rays and can be carried out in places where no X-ray facilities are available

Attempts at local closure of fæcal fistula from the cæcal area invariably are a failure If fæcal fistula through the lumbar triangle is found, secondary to appendicitis, an operation should be undertaken through the anterior abdominal wall, using a fairly wide incision Adequate preparation should be carried out in anticipation of having to undertake a major resection of the right side of the colon It may be possible to remove the appendix completely after mobilising the cæcum in some cases, but there is not infrequently much inflammatory reaction about the whole cæcal area, making a local removal of the appendix very difficult In these cases it may be necessary to undertake a right hemicolectomy with an anastomotic reconstruction of the intestinal tract No cases of fæcal fistula have been seen secondary to regional ileitis Only one case suggestive of regional

follows the withdrawal of the clamped portions of gut With a swab held in the abdomen over the fistula area, the outside of the track is gently curetted to remove a certain amount of mucus-secreting cells in the track Care must be exercised to avoid damage to local structures It is not necessary to close the small opening produced by the fistula track This opening has a swab temporarily packed into it The area closes very quickly with granulation tissue and the skin heals over in about ten days Dressings are required for about two weeks only The opening present after removal of the gut is usually not larger than that which would admit a lead pencil The abdominal wall is closed in the usual way

Patients with the fæcal fistula in the scrotal position—that is, lower down than that seen following a strangulated Richter's hernia—usually come to hospital in a very feeble condition about one week after the onset of the strangulated hernia The prognosis in these cases is very poor The patient is initially seldom fit for any form of major surgery It is advised in these cases that, following a blood transfusion which is a great advantage, a laparotomy be performed and a side-to-side anastomosis be done in order to by pass the fistula area and so relieve the obstruction to the distal bowel A fistula with complete obstruction beyond it is much more serious than a fistula alone, where some of the intestinal contents can pass By undertaking a by-pass anastomosis the obstruction is relieved though the fistula remains A complete resection and anastomosis in these very ill patients should not be undertaken A by-pass alone should be instituted

If the intestinal obstruction is relieved successfully the patient's general condition may improve rapidly Every effort should be made to improve the patient's general condition after admission to hospital and prior to undertaking the anastomosis If a blood transfusion is not given before operation these patients almost invariably die Several doses of sulphaguanidine can be given before the operation also The patient at this stage is usually not vomiting, or, if so, very little Intravenous sodium chloride and potassium chloride should also be given—

chloride

of anæs

operation can be undertaken three months later to deal with the residual fistula It is advisable at the second operation, when the patient is in better condition, to remove the temporary side-to-side anastomosis and replace it with an end-to-end anastomosis It is advisable in this case also to undertake the anastomosis sufficiently far back to allow of the application of the clamps outside the abdominal wall for safety

Fæcal fistula following femoral hernia is less common than the condition resulting from strangulated inguinal hernia Most strangulated femoral hernia patients die if not relieved by surgical means No cases have been noted following strangulated umbilical hernia

Fæcal fistula following appendicitis with local gangrene of the cæcal wall is seen occasionally If there is no active pathology in the wall of the cæcum, other than that due to the adjacent inflammation of the appendix, and no distal obstruction in the colon, the fistula invariably closes spontaneously after one to two weeks If the fistula secondary to appendicitis arises as a result of gangrene of a portion

of the terminal ileum there may be great difficulty in getting the fistula to close It does not tend to close spontaneously because of the slight obstructive action of the ileocæcal valve If a chronic fæcal fistula of the appendix area is seen, the case should be investigated for any condition which may be giving rise to obstruction in the large bowel Schistosomiasis, amœbiasis, actinomycosis and tuberculosis should be considered Stool specimens need to be examined and a sigmoidoscopic examination undertaken Sigmoidoscopic biopsy should be employed if the appearances suggest any pathological lesion in the areas examined Amœbic dysentery may be detected from mucus removed by scoop or on swabs Biopsy of the granulation tissue in the wall of the fistula may also be helpful, particularly in cases of a tuberculous nature Actinomycosis and fungoid conditions may also be detected in this way Pathological changes in the cæcum may give rise to symptoms very like those of appendicitis In these cases the appendix may be removed, the true nature of the cæcal condition being discovered at operation or following investigation of a residual fæcal fistula some time later

Appendicular fæcal fistula has been noted on a few occasions occurring in the lumbar triangle of Petit This occurs more commonly in patients with a high cæcum and an appendix in the retrocæcal position, the tip of the appendix in these cases being *almost precisely over the inside of the lumbar triangle* This high position of the cæcum is not commonly seen in Europe, it is much more common in African patients [illegible] the lumbar area may be suggest[illegible] pus, fæcal material is [illegible] it can be concluded with fair certainty that the abscess present was due to a ruptured retrocæcal appendix There may be very little fæcal material present in the discharge and a sinus secondary to spinal bone disease may be suspected Lipiodol X-ray investigation is not necessarily very helpful in these cases One or *more irregular tracks may be noted, and it is seldom apparent* what is the true basis of the essential pathology when using this method Much the easiest procedure is to give the patient a spoonful of charcoal with plenty of fluid to drink, and follow this with a saline aperient as previously suggested for other forms of fistula

The presence of specks of charcoal on the white swab dressings invariably indicates the nature of the condition within twenty-four hours This method is more helpful than X-rays and can be carried out in places where no X-ray facilities are available

Attempts at local closure of fæcal fistula from the cæcal area invariably are a failure *If fæcal fistula through the lumbar triangle* is found, secondary to appendicitis, an operation should be undertaken through the anterior abdominal wall, using a fairly wide incision Adequate preparation should be carried out in anticipation of having to undertake a major resection of the right side of the colon It may be possible to remove the appendix completely after mobilising the cæcum in some cases, but there is not infrequently much inflammatory reaction about the whole cæcal area, making a local removal of the appendix very difficult In these cases it may be necessary to undertake a right hemicolectomy with an anastomotic reconstruction of the intestinal tract No cases of fæcal fistula have *been seen secondary to regional* ileitis Only one case suggestive of regional

ileitis having been seen in the tropics, the true nature of the pathology was not confirmed microscopically in this case

Rectovaginal fæcal fistula is very commonly seen in most parts of the tropics There are four types seen—the congenital variety, those of the post-partum variety, some secondary lymphogranuloma inguinale and, rarely, some of malignant origin The congenital rectovaginal fistula associated with imperforate anus seen in female infants has already been considered In adult female patients most of these cases are of a post-partum type, following difficult childbirth This subject is considered under the section dealing with complications of childbirth In cases where the fistula is due to lymphogranuloma inguinale there is invariably other evidence of the disease about the anogenital area A rectal stricture is not uncommonly found above the level of the fistula A rectovaginal fistula due to lymphogranuloma inguinale is usually made much worse by any attempt to close it by surgery The tissues are in a very unhealthy state Before any attempt is made to close a fistula of this type, a full course of chloromycetin should be given on two occasions The underlying disease is very responsive to treatment by this drug If there is only a small fistula present and the disease is still active, the case may be tremendously improved by the use of chloromycetin In one case of this type so treated, the fistula closed by itself and operation was not required The original fistula was not of very large size

Fæcal fistula secondary to ulcerative colitis is reported but no cases of this variety have been seen Ulcerative colitis does not occur frequently in the local inhabitants of West Africa The condition appears to be much more common in India No cases have been seen of fæcal fistula secondary to schistosomiasis or amœbiasis If either of these conditions is suspected as being the cause of fistula formation the underlying pathology should be treated primarily Both conditions are very responsive to specific treatment Cases of vesicocolic type of fæcal fistula have been seen and treated on a few occasions, they were considered likely to have been secondary to sigmoid diverticulitis No evidence of amœbiasis was found in any of the cases The sign which brings the condition to notice most frequently is the passage of gas per urethram in a patient suffering from cystitis There is invariably a heavy coliform infection present in the urine in these cases Every effort should be made to ascertain the nature and cause of the condition before surgical treatment is undertaken It may be necessary to treat the underlying cause of the condition initially

Operation undertaken for the removal of internal fæcal fistulæ may be quite difficult and extensive There frequently is much associated inflammation locally It is desirable in almost all cases to resect the whole fistulous area rather than separate the communicating structures and make a very local approach A wide margin of tissue should be removed so that the repair of the structures will be in healthy tissues A bladder repair in a male patient should be followed by a temporary suprapubic cystotomy to prevent a rise of intravesical pressure during healing Urethral drainage is not satisfactory in male patients though it may be so in female patients

A gastrocolic fistula is seen occasionally The condition is not difficult to recognise The patient almost invariably gives a history of chronic diarrhœa

The bowel action occurs soon after food has been eaten These patients usually note that in the motions passed food recently eaten can be recognised in an undigested state Tomato skin fragments are one of the particles which draw the patient's attention to the passage of undigested food in most cases It has been noted in cases of gastrocolic fistula that the patients usually suffer from marked anæmia without any obvious internal hæmorrhage having taken place The reason for this is not known

Fistula-in-ano is a common form of fæcal fistula though it is seldom thought of in terms of this condition The condition follows ischiorectal abscess associated with infection in the congenital pit formation in the walls of the rectum The subject is discussed under Diseases of the Rectum, Chapter 8 Some cases have been seen where a fistula-in-ano was associated with a large thick piece of fish bone ulcerating through from the rectum to the perineum Clezio [101] described a fæcal fistula of the abdominal wall due to a fish bone which ulcerated from the intestinal tract through the abdominal wall to the surface leaving a residual fistula If a fæcal fistula is seen in an unusual position, the possibility of a foreign body should be considered as a possible cause Where straight pins perforate the gut and work out to the surface of the body they do not usually form fæcal fistulæ, being of small calibre, the minute gut perforation probably closes immediately the pin leaves it

Some cases have been seen with spinal tuberculosis where kyphosis and paraspinal abscess were present and a tuberculous sinus came out in the loin, and where, in addition, a fæcal fistula was associated with the discharging area No doubt the tuberculous sinus involved the descending colon and damaged the wall of the large intestine, causing a fæcal fistula In two instances this combination was found to be present These are difficult cases to deal with In one small girl aged about 5 years with such a combination of conditions present, a fæcal fistula was removed by resection of the piece of descending colon involved The patient was given preliminary treatment in hospital for several months before the operation was undertaken The fæcal discharge stopped following the operation, but the tuberculous sinus continued to discharge seropurulent material in small quantities The patient was very much improved by the operation

There is an important group of fæcal fistulæ secondary to surgical trauma These are still seen comparatively frequently These cases are more common in the tropics than in temperate climates where doctors with limited experience in many instances have to deal with patients suffering from disease at an advanced stage Many female patients are seen with a chronically infected tubo-ovarian condition requiring surgical treatment Limited improvement occurs following rest, sedatives, antibiotics and sulpha preparations A major surgical operation is often ultimately necessary for the removal of the massive tubo-ovarian inflammatory condition present A loop of small gut may be seriously involved in the mass The upper third of the surface of the rectum may be seriously involved by the extensive inflammation present In these cases a fæcal fistula may develop some days after the operation This is a serious complication If such a complication occurs it is better not to undertake any further major surgery at this stage If the fistula comes from the rectum or part of the large bowel above the

ileitis having been seen in the tropics, the true nature of the pathology was not confirmed microscopically in this case

Rectovaginal fæcal fistula is very commonly seen in most parts of the tropics There are four types seen—the congenital variety, those of the post-partum variety, some secondary lymphogranuloma inguinale and, rarely, some of malignant origin The congenital rectovaginal fistula associated with imperforate anus seen in female infants has already been considered In adult female patients most of these cases are of a post-partum type, following difficult childbirth This subject is considered under the section dealing with complications of childbirth In cases where the fistula is due to lymphogranuloma inguinale there is invariably other evidence of the disease about the anogenital area A rectal stricture is not uncommonly found above the level of the fistula A rectovaginal fistula due to lymphogranuloma inguinale is usually made much worse by any attempt to close it by surgery The tissues are in a very unhealthy state Before any attempt is made to close a fistula of this type, a full course of chloromycetin should be given on two occasions The underlying disease is very responsive to treatment by this drug If there is only a small fistula present and the disease is still active, the case may be tremendously improved by the use of chloromycetin In one case of this type so treated, the fistula closed by itself and operation was not required The original fistula was not of very large size

Fæcal fistula secondary to ulcerative colitis is reported but no cases of this variety have been seen Ulcerative colitis does not occur frequently in the local inhabitants of West Africa The condition appears to be much more common in India No cases have been seen of fæcal fistula secondary to schistosomiasis or amœbiasis If either of these conditions is suspected as being the cause of fistula [illegible]

have been secondary to sigmoid diverticulitis No evidence of amœbiasis was found in any of the cases The sign which brings the condition to notice most frequently is the passage of gas per urethram in a patient suffering from cystitis There is invariably a heavy coliform infection present in the urine in these cases Every effort should be made to ascertain the nature and cause of the condition before surgical treatment is undertaken It may be necessary to treat the underlying cause of the condition initially

Operation undertaken for the removal of internal fæcal fistulæ may be quite difficult and extensive There frequently is much associated inflammation locally *It is desirable in almost all cases to resect the whole fistulous area rather than* separate the communicating structures and make a very local approach A wide margin of tissue should be removed so that the repair of the structures will be in healthy tissues A bladder repair in a male patient should be followed by a temporary suprapubic cystotomy to prevent a rise of intravesical pressure during healing Urethral drainage is not satisfactory in male patients though it may be so in female patients

A gastrocolic fistula is seen occasionally The condition is not difficult to recognise The patient almost invariably gives a history of chronic diarrhœa

fistula was due to an unskilled attempt to evacuate a pregnant uterus, where no doubt a perforation of the back of the uterus occurred and a piece of small gut was pulled into the perforation There is little doubt that a condition rather like a Richter s hernia was produced, not causing complete intestinal obstruction and probably the gut caught in the uterine perforation gave way at its apex a day or two later, but not immediately, fæces discharging through the uterine cervix If the small gut is torn at the time of perforation of the uterus, the patient invariably dies of general peritonitis Realising that small gut fistulæ do not close as easily as large gut fistulæ, it was considered wise to perform an operation through the lower abdominal wall The piece of small gut involved was resected and the patient recovered quickly *At the time of first being seen the patient s* general condition was quite good The nature of production of the fistula was admitted

On rare occasions a fæcal fistula may develop following neglected gunshot wound of the abdomen If a pellet wound is single and small, a localised abscess may form, and this subsequently breaks down or is opened with formation of fæcal fistula All gunshot wound cases of the abdomen should be operated upon as soon as possible after the receipt of the wound The same may happen with minute punctures due to stab wounds

RUPTURE OF ABDOMINAL ORGANS

In considering this section the situation in mind is of the closed abdominal injury which may give rise to much difficulty in diagnosis In these cases the patient is admitted following a severe accident of some sort and is obviously in a shocked state There is no external wound other than minor bruises or superficial abrasions This type of case is frequently seen and is a constant source of worry to those with limited experience Those with many years of experience may at times also be embarrassed by an error in diagnosis The possibility of rupture of an internal organ immediately comes to mind Damage to any abdominal viscus is a *catastrophe of the most serious type Early diagnosis is* difficult and delay is highly dangerous Operation with limited assistance and facilities is difficult, and to transfer such a case to a main centre for treatment may mean a critical loss of valuable time A high proportion of these cases of ruptured internal organs die because of the difficulty of making an early and accurate diagnosis and instituting appropriate treatment If a patient receives a large open wound anywhere on the body there is little difficulty in dealing with the case The diagnosis is apparent and the case is treated promptly, the nature of the condition being obvious The difficulty of early diagnosis and the hesitancy in taking decisive action, on slender physical signs, predisposes to the poor results often noted *in this type of case When it becomes quite obvious* that an internal hæmorrhage has occurred, the patient may collapse suddenly

A much higher number of ruptured spleens are noted at post mortem examinat ons than in any operating threatre If earlier diagnosis could be made

with fa

lost I

rectum the fistula usually closes spontaneously If, however, the fistula is fr the small bowel it is not likely to close by itself, or if it does it does so much m slowly, and it may close and open repeatedly The same is the case in the ileoca area If there is evidence or likelihood of fæcal fistula developing, following pel operation where the rectum is implicated, a large sized flatus tube should be i in the rectum per anum so that there is no increase of gas pressure in the rect following operation In fæcal fistula from the rectum following pelvic surge further operation is seldom required, the fæcal discharge usually stops in two three weeks If the fistula is from small gut, it goes on for several months and v almost certainly ultimately have to be resected The urgency of the resection these cases is accentuated by the excoriating effect of the upper intestinal conte which burn the skin about the wound Whether a fæcal fistula is from the sn or large bowel can usually be judged by the appearance of the skin about the fistu In cases of small gut fistula it is necessary to oil the skin in the area of the surf discharge

On one occasion a patient was sent by lorry from a country station o 200 miles away from the main centre with an abdominal wound packed and artery forceps still attached to deep pelvic blood vessels It had not been fou possible to arrest the hæmorrhage Bleeding restarted each time after ligati and removal of forceps, in spite of several attempts being made The patie after admission and examination, was given a blood transfusion but her conditi appeared reasonably good It was obviously desirable to remove the packs a artery forceps at an early stage Twenty four hours later this was undertak without undue difficulty A very large quantity of very thick silk twist ligati material was removed from the depths of the pelvis The patient developec fæcal fistula some days later This was not altogether unexpected It w considered wiser to treat the patient conservatively at that time, using a large flat tube in the rectum It was apparent at the operation that the most traumatis area was the upper third of the rectum, and in view of this finding it was possil to reassure the patient of the good prospect of the fistula closing without furth operation being necessary This happened as anticipated, the discharge stopp within two weeks In very few instances is it necessary to operate on fæcal fist cases as an emergency procedure The use of very heavy ligature mater undoubtedly predisposes to fistula formation In ligating deeply seated vess strong but fine-calibre ligatures should be employed

In about 5 per cent of cases of fracture of the pelvis ruptured urethra occu Damage to the rectum occurs in about 1 per cent of cases of fracture of the pelv In some neglected cases of rupture of the urethra with urinary fistula formatic fæcal fistula may form later, indicating that a pelvic abscess involving the wall the rectum has ruptured into a fistulous track These cases are very difficult deal with The patient being in poor condition a fracture of the pelvis still bei present and urinary fistula still discharging no attempt should be made undertake further surgery A flatus tube in the rectum may encourage the rect communication to close

One fæcal fistula case of several months duration was treated where the fæc fistula was between the ileum and the back of the uterine cervical canal Tl

hæmorrhage, there is a progressive rise in the pulse-rate, but in spite of the rise *in pulse-rate*, the blood-pressure is well maintained for up to twenty-four hours The rising pulse-rate may be due to the absorption of inflammatory products produced by the peritonitis The blood-pressure is determined much more by interference with the patient's total blood volume In the absence of blood loss there may be a high pulse-rate but quite a good blood-pressure The presence of peritonitis of over twenty-four hours' duration is associated with an *increasing* exudate of inflammatory origin, and the pouring out of serum from the circulation associated with this may account for the rise *in pulse-rate, to some extent*, as a result of fluid loss from the circulation If there is a fall of blood-pressure during *the first twelve hours following a serious accident in any patient, it can be concluded* there has been a loss of blood at some point Some allowance may be made for *initial* "*neurogenic shock*" *which* occurs immediately following any accident, it is due to pain and nervous factors, but passes off within two hours of receipt of the injury in most cases The majority of serious accident cases arrive at hospital more than two hours after the receipt of the injury for which they are brought for treatment, they often have to travel long distances from the scene of the accident

Any abdominal organ may be injured The object of this section is not to discuss the particular findings following injury of individual organs but rather to indicate the means of arriving at an early diagnosis of internal hæmorrhage of any sort, so that where operation is indicated it may be undertaken while the *patient is still in reasonably good condition* For *many years the method* was adopted of estimating the patient's condition by making a comparison between *the patient's systolic blood-pressure and the pulse-rate It can be assumed with* fair accuracy that a patient is suffering from marked shock if the systolic blood-pressure reading in millimetres of mercury is *below the figure given for the* pulse-rate in beats per minute If a patient's systolic blood-pressure is 90 mm mercury and the pulse rate is 110 per minute, there is no doubt *that there is* marked shock present This method, though accurate enough and quite useful, is apparent only at a late stage of shock, and it is desirable to seek means which may indicate internal bleeding and shock in its earlier stages With this in view some observations may be made which, though very simple and commonplace, are very important, and give an indication of how a much earlier diagnosis can be arrived at in cases of internal hæmorrhage

It is well known that patients who faint fall to the ground or slump in the chair in which they are sitting Following the collapse and lying in the horizontal *position on the ground, they* soon recover consciousness If a patient feels dizzy the subjective feelings are quickly relieved by lying down or sitting with the head lowered to a position between the knees By *these simple means* the cerebral blood supply is improved and the feeling of faintness goes off Following a gross hæmorrhage of any sort *there is a marked tendency to faint* This is seen in hæmateme

pregnancy

due to a wound also may give rise to a fainting attack If a patient's

an operating table becomes poor and the pulse-rate increases, *marked improvement* may occur if the table is tilted from the horizontal to the slightly head down

localised area about the abdomen may give some indication of the nature of the internal injury sustained A ruptured spleen is much more likely if the patient has been struck on the left side of the abdomen or lower part of the chest posteriorly The commonest form of internal hæmorrhage following accident in the tropics is that due to rupture of the spleen Enlargement of the spleen is much more common in the tropics than in temperate climates The association between enlarged spleen and chronic malaria and other diseases is well known Apart from violent accident cases, the form of internal hæmorrhage most commonly seen in the tropics is that due to ruptured ectopic pregnancy in female patients Doctors working in the tropics have much greater opportunities of observing patients suffering from internal hæmorrhage than those working in non tropical areas Ectopic pregnancy is not difficult to diagnose in most cases after the condition has been seen on a few occasions An adult female patient admitted to hospital with a poor pulse, slight abdominal distension, lower abdominal pain, pallor of the conjunctiva and a history of one missed menstrual period are very typical In a high proportion of the cases, on examination of the abdomen, there is a fluid thrill present due to the accumulation of a large quantity of free blood in the peritoneal cavity

Traumatic rupture of a pregnant uterus in a woman advanced in term is also usually not difficult to diagnose In these cases there is a history of an accident, a markedly enlarged uterus, a very fast pulse-rate and, associated with vaginal [illegible] portion of cases of this [illegible] ry sufficiently violent [illegible] A case of ruptured uterus at full term due to a lorry accident occurred close to the entrance of a hospital in West Africa The patient was admitted fifteen minutes after the mishap but she was found to be in a moribund condition In view of the possibility of being able to remove the baby immediately, rapid arrangements were made to undertake a Cæsarean section on decease of the mother On removing the infant it was found to be dead as a result of complete separation of the placenta from the uterine wall

Traumatic rupture of the intestinal tract is less common by itself than when accompanied by internal hæmorrhage from damaged mesenteric vessels Injury sufficient to damage the intestine almost invariably damages the local blood-vessels extensively Tearing of the mesenteric vessels is an accident which is very liable to happen where patients are struck on the abdomen by the swinging load of a crane One such case of this type was seen and operated upon soon after admission to hospital, a logging accident had been sustained two hours earlier There was a large quantity of blood free in the peritoneal cavity, due to an extensive tear of the mesentery of the small intestine The mesentery had been pulled away from the bowel for about 18 in, but fortunately the intestinal lumen had not been torn the abdominal cavity was therefore not infected It was possible to use the patient's own blood for an autotransfusion A wide resection of the part of the small intestine separated from its basic mesentery, though not itself ruptured, was undertaken The patient made an uneventful recovery In cases of peritonitis due to rupture of the intestine, but not associated with gross internal

A tilt response above 25 beats per minute does not occur in the absence of hæmorrhage If constitutional signs arise during the test the patient should be returned to horizontal Readings of pulse-rate are taken after one, two and three minutes in tilt position The tilt position should not be maintained longer than is essential to get a positive result Prolonged cerebral anoxæmia is dangerous and should thus be avoided Most doctors may have noted cases where, following pentothal or other barbiturate intravenous anæsthesia, there may have been a slight collapse with temporary cessation of respiration and then recovery If this happens some patients suffer from prolonged interference with mental processes The defect most commonly seen is a loss of memory Patients may not only forget well-known facts but may lose their memory of places or individuals

In one patient seen this occurred to a marked degree and she had to be constantly attended and accompanied as she could not remember places in the town or well-known people for about four months If with the tilt test a patient's pulse rises to 20 increase, a hæmorrhage has almost certainly occurred, but of less than 1 pint, and a transfusion in these cases is not essential but may be desirable If the figure 25 is used as a critical level for blood loss and the necessity of a transfusion being given, it will be found very useful The figures are average findings to avoid confusion, and some variations occur It seems that there is only a small alteration in blood-pressure until a pint of blood has been lost, if the pressure is taken in the horizontal position of the patient The tilt position increases the fall in blood-pressure, but it is recommended that the pulse-rate should be used as a means of detecting the cardiovascular disturbance The pulse-rate method is easier to use and allows of observation of the patient's face being made during the counting Any method which tends to simplicity is a great advantage, especially for those working alone in country stations

The tilt test is of use in two respects first and most important, as a method of early diagnosis in concealed hæmorrhage cases, and secondly as a method [illegible] blood loss, whether open or concealed, with a view [illegible] useful, it is advised [illegible] the patient to be tested can be placed, the foot end of the solid stretcher being placed against a wall so that it cannot slip forward and a solid support made of the correct height so that an angle of 75 degrees is produced for a few minutes during the time of the test Because of the marked slope present, it is essential to have two circular strap supports fixed, one at each side of the middle of the stretcher, through which the patient's legs can be placed so that on tilting, slipping down does not occur In most cases a pulse-rate reading taken with the patient first in the horizontal position, followed by a further reading after one minute in the tilt position, is all that is necessary for the purposes of the test and to arrive at a diagnosis

The tilt test method of estimating blood loss is very simple and useful as it does not necessitate any complicated apparatus other than a watch with a seconds hand

Estimation of blood volume can be undertaken by the dye method, but this is complicated and time-consuming A fixed quantity of dye being introduced

position From observations of this type it is obvious that an advantage is gained by posture The pulse of a patient in poor condition is much better when lying down than when standing up Without calculated experimental work undertaken it would be difficult to estimate the advantage of assuming the horizontal position or disadvantage of assuming the vertical position

With a view to estimating the disadvantage of assuming the raised position in cases of blood loss, Green and Metheny [102] undertook valuable experiments where groups of volunteers agreed to sustain calculated blood loss by venesection, known quantities of blood being removed from each group of patients Initial control experiments were also undertaken to determine the effect of posture on patients without loss of blood In order to make the measurements precise regarding the degree of tilt used in the experiments, a fixed angle of 75 degrees from the horizontal was used in all cases The patient's stretcher was raised at the head end to this high angle Initial pulse and blood-pressure readings were taken with the patient in the horizontal position until these remained steady They were subsequently taken again after tilting to 75 degrees, the head end being raised Readings were taken at one, two and three minutes Four control groups were used without venesection being undertaken in any of them Group 1—healthy men aged between 18 and 42 years, Group 2—elderly patients over 75 years, Group 3—patients known to have cardiac disease, Group 4—those with chronic anæmia, not of traumatic origin In the control groups the rise of pulse-rate on tilting was from five to ten beats per minute, but not in excess of this figure in any case Group 1 was now divided into three sections of healthy adults From the first series 500 c c of blood was removed rapidly by venesection From the second series 1,000 c c of blood was removed by venesection and from the third series 1,500 c c of blood was removed by the same method The pulse and blood-pressures were taken in all individuals before venesection while in the horizontal position They were again taken in the horizontal position after venesection The patient was finally tilted up to 75 degrees and the pulse-rate and blood-pressure taken again at one, two and three minutes The patients were then returned to the horizontal position The results are of very considerable interest and of great value when applied to clinical practice To facilitate comparison the findings are brought together and the following observations are noted

The pulse-rate gives an earlier indication of blood loss than does the blood pressure
The alteration in the pulse-rate with blood loss is greatly accelerated by the high tilt position
The increased pulse-rate can be correlated with blood loss using the tilt method

Blood Loss	Pulse Rise in Horizontal Position	Pulse Rise at 75 Degrees	Other Signs
500 c c	3 beats per minute	20 beats per minute	None
1 000 c c	7 beats per minute	40 beats per minute	None
1,500 c c	17 beats per minute	Over 40 beats per minute	Dizziness (faintness, sweating and air hunger)

Very few patients with an internal hæmorrhage have ever volunteered the information that they had a pain in the left shoulder This is not a valuable sign in diagnosis

In cases of fracture of the pelvis there may be no evidence of external injury, but an enormous internal hæmorrhage in the extraperitoneal position may be present This form of concealed internal hæmorrhage results from tearing of the external iliac vein or its associated vessels In these cases there is usually not less than 2 pints of blood extravasated in the retropubic position and spreading round the sides of the pelvis and up the posterior abdominal wall In almost all cases of fracture of the pelvis a blood transfusion is an advantage This is the best method

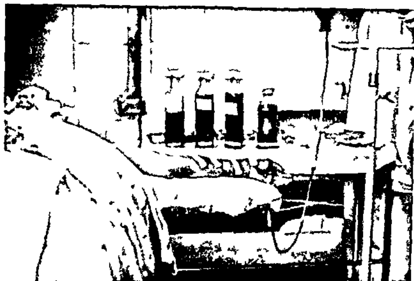


FIG 50
Autotransfusion being given for massive internal hæmorrhage

of dealing with the marked shock which so often is seen in these cases Following fracture of the pelvis, it is necessary to examine the patient to exclude damage to the bladder or the urethra, this is particularly the case in adult male patients If the urethra is injured it is usual to find blood coming from the external urinary meatus If damage to the lower urinary tract is suspected, the patient should be catheterised in the theatre to see if clear urine can be withdrawn from the bladder If the urethra is damaged the catheter seldom enters the bladder If clear urine is withdrawn from the urinary bladder without difficulty, it can be concluded with fair certainty that there has been no injury to the genito urinary tract This subject is dealt with under the section on genito urinary conditions

In spite of the very large number of accident cases seen, rupture of the kidney in African patients seems to be a very rare accident The reason for this is not obvious, the possibility suggests itself that because of the much more marked secondary spinal curves in these patients and the more horizontal position of the sacrum with prominence of the buttocks, the kidneys are much less likely to be

intravenously and after circulating for a fixed time, a sample is taken and the degree of dilution estimated by colorimetric methods This is not practical for doctors in up-country stations where very limited laboratory facilities exist The dye test also has the disadvantage that if the circulating blood volume is estimated the blood loss is concluded on the assumption that the patient originally had a full blood volume for a patient of his or her size, but this may not be the case

Hæmoglobin estimation has been used in the past as a rough means of estimating the amount of blood loss in patients following hæmorrhage This again is not very accurate If a hæmoglobin estimate is made in a person who is giving blood for a transfusion and another reading is taken soon after the blood is removed, the hæmoglobin percentage will be found to be almost identical in spite of the blood removed If, however, another reading is taken the next day, it will be found that the hæmoglobin percentage has dropped about 10 per cent following the removal of one pint of blood This indicates that the pint of blood removed has been replaced by tissue fluids so that the original volume is restored There is therefore a hæmodilution and a fall in the hæmoglobin The fall in hæmoglobin percentage reading indicates the degree of hæmodilution rather than the estimate of an immediate blood loss It is not very unusual to find that the condition of a patient who has sustained a hæmorrhage may be improved after twenty-four or forty-eight hours, although his hæmoglobin percentage has fallen The improvement is due to some restoration of blood volume by compensation Again, if hæmoglobin estimation is used as a rough indication of blood loss, or hæmodilution dependent on blood loss, it is not known what the hæmoglobin level was before the blood loss The patient's original hæmoglobin may not have been 100 per cent

Blood-pressure readings as an indication of blood loss and shock may be subject to fallacy in that a patient before an accident may have had a very high blood pressure and, on this falling considerably, due to marked shock, may be considered to be normal when taken, although in fact it is much below the original level as a result of the accident The assumption is usually worked on that the blood-pressure was the expected normal for a healthy adult of the patient's age and build

The tilt test being one for deficiency of blood volume is of value because of its simplicity and freedom from errors dependent on comparisons It is very suitable for use in country stations as well as in large centres, which is most important

The nature of an internal hæmorrhage may be concluded by the site of the maximum pain following an injury Personal clinical notes have been made in the past of the amount of blood found in the peritoneal cavity in cases of ruptured ectopic pregnancy where a fluid thrill could be detected and where no fluid thrill was felt It seems very difficult to detect a fluid thrill unless there is at least 2 pints of free blood in the peritoneal cavity of an adult patient This means that a very extensive hæmorrhage has taken place (Fig 50) before it can be diagnosed by the presence of this sign, in a case of ruptured spleen or ruptured ectopic pregnancy With the tilt test a diagnosis can be presumed after the loss of somewhat less than 500 c c of blood or under one pint The tilt test is positive long before a fluid thrill is present in a case of internal hæmorrhage

Very few patients with an internal hæmorrhage have ever volunteered the information that they had a pain in the left shoulder. This is not a valuable sign in diagnosis.

In cases of fracture of the pelvis there may be no evidence of external injury, but an *enormous* internal hæmorrhage in the extraperitoneal position may be present. This form of concealed internal hæmorrhage results from tearing of the external iliac vein or its associated vessels. In these cases there is usually not less than 2 pints of blood extravasated in the retropubic position and spreading round the sides of the pelvis and up the posterior abdominal wall. In almost all cases of fracture of the pelvis a blood transfusion is an advantage. This is the best method



FIG 50
Autotransfusion being given for massive internal hæmorrhage

of dealing with the marked shock which so often is seen in these cases. Following fracture of the pelvis, it is necessary to examine the patient to exclude damage to the bladder or the urethra; this is particularly the case in adult male patients. If the urethra is injured it is usual to find blood coming from the external urinary meatus. If damage to the lower urinary tract is suspected, the patient should be catheterised in the theatre to see if clear urine can be withdrawn from the bladder. If the urethra is damaged the catheter seldom enters the bladder. If clear urine is withdrawn from the urinary bladder without difficulty, it can be concluded with fair certainty that there has been no injury to the genito urinary tract. This subject is dealt with under the section on genito urinary conditions.

In spite of the very large number of accident cases seen, rupture of the kidney in African patients seems to be a very rare accident. The reason for this is not obvious; the possibility suggests itself that because of the much more marked secondary spinal curves in these patients and the more horizontal position of the sacrum with prominence of the buttocks, the kidneys are much less likely to be

struck directly when a fall on the back occurs than in patients with less well-developed secondary spinal curves, as noted in European patients Injuries of individual organs of the abdomen are considered in greater detail under appropriate sections

The remarks made in this chapter are intended only to be of a general nature as may be helpful in arriving at an early diagnosis in cases of concealed hæmorrhage in abdominal cases, a problem which faces many a doctor where, in the absence of specialised departments, cases of all sorts are thrust upon him in ever increasing numbers

TORSION OF VISCERA

Torsion of abdominal viscera is seen more frequently in the tropical areas of the world than in temperate areas This is because of the frequency with which volvulus of the sigmoid colon is seen, volvulus of the small bowel is also not infrequently encountered The association of chronic malaria and enlargement of the spleen in the tropics is well known and the occurrence of torsion of the spleen must be kept in mind in dealing with cases of abdominal distension in which an upper abdominal mass is detected Almost any abdominal structure may be twisted on its permanent attachment The essential changes seen in any form of torsion are displacement of the structure involved, interference with the blood supply of the pedicle, and upset of the function of the part involved All forms of torsion are associated with the presence of a narrow movable base to which is attached a comparatively large structure There is very frequently some obstructive element present concomitant with the twisting Marked fixity at one area and considerable laxity beyond this are seen in a high proportion of the cases *Volvulus of the sigmoid colon is the most common form of torsion involving any* part of the intestinal tract in most parts of the tropics Volvulus of the cæcum is rare, rotation of the transverse colon is exceptionally rare volvulus of the *stomach is least common of all Wilson [103] reports a case of gastric volvulus seen* in East Africa, but comments on the rarity of the condition

Torsion of the small intestine, which is not very uncommon in female patients in the *tropics, is in almost all cases a form of band obstruction The condition* is usually caused by an adhesion placed between the posterior aspect of a piece of small intestine and the back of the anterior abdominal wall The adhesion is almost invariably *attached to the posterior aspect* of the anterior abdominal wall in a position above and to the right of a line corresponding to the attachment of the mesentery of the small intestine A very high proportion of cases of intestinal obstruction of the small bowel due to band adhesions are situated to the right of the middle line

Torsion of an enlarged spleen is less common than torsion of the sigmoid colon Rotation of an ovarian cyst on its narrow pedicle is also seen more commonly in the tropics than in Europe because of the later time at which patients go to hospital for treatment In many cases an ovarian cyst may have been present for a year or two before it became twisted By this time it has reached a large size in many instances Cases of strangulated ovarian cyst have been noted where

the cyst has become completely detached due to gangrene of the pedicle as a result of torsion The cyst in these cases is found free in the peritoneal cavity with masses of peritoneum wrapped round it

A young adult female patient was seen many years ago, who was thought to have some form of intestinal obstruction of the small bowel A laparotomy was undertaken and it was found at operation that she was suffering from complete torsion of a pregnant uterus The patient was four months pregnant Fortunately the condition was detected within twenty-four hours of onset The apparent intestinal obstruction in this case was due to the inhibitory effect of the pelvic abnormality The patient was found to have a fibroid of the lower part of the body of the uterus on the left side The diameter of the fibroid was about 1½ in It was considered unwise to interfere with the fibroid in any way or try to remove it because of the pregnancy present It is not certain whether the fibroid was in any way an ætiological factor in the mechanism of the rotation of the uterus The uterus was firmly adherent to the surrounding structures and appeared *to be held in position by some form of suction* It was untwisted from its abnormal position, and after rectifying the condition three or four light catgut sutures were put between the anterior aspect of the body of the uterus and the top of the bladder to decrease the risk of recurrence The patient's pregnancy went to term and delivery occurred normally in spite of the fibroid being present

Patients suffering from torsion of viscera are almost invariably sent into hospital with a diagnosis of intestinal obstruction because of the direct or indirect implication of the bowel at some part Bowel torsions of various forms make up one large group of cases of intestinal obstruction The bowel symptoms may be of a primary or a secondary nature, depending on the structure twisted In cases of torsion of the spleen or an ovarian cyst, the bowel symptoms are secondary in nature Twelve cases of torsion of ovarian cyst have been operated upon and four cases of torsion of spleen This is not a very large number in twenty years, but sufficient to necessitate keeping the conditions in mind The two conditions, though very different in cause, give rise to signs very like each other, if both conditions are seen in female patients Each patient complains of vomiting, intestinal distension and abdominal pain In each case there is a distended abdomen and a centrally placed hard and large tumour noted In both cases there is often a temperature of about 100° or 101° F The fever is due to the reabsorption of extravasated blood and serum It is necessary to decide to which area the tumour is attached, if attachment is from below, an ovarian cyst is likely to be the cause of the condition *If the mass is attached above, the tumour present* is most likely to be an enlarged and twisted spleen The tumour in each case is centrally placed, not necessarily more to one side than the other Fig 51 shows a patient being operated upon for removal of a very large spleen which had been in a state of torsion for forty-eight hours The rotation was in the anti-clockwise direction—two and a half turns had taken place In a high proportion of cases of any form of torsion, patients tend to come to hospital about two days after the onset of symptoms, if living in the country In the towns the patients come to hospital at an earlier stage If a patient is seen within eight hours of the onset

struck directly when a fall on the back occurs than in patients with less well-developed secondary spinal curves, as noted in European patients Injuries of individual organs of the abdomen are considered in greater detail under appropriate sections

The remarks made in this chapter are intended only to be of a general nature as may be helpful in arriving at an early diagnosis in cases of concealed hæmorrhage in abdominal cases, a problem which faces many a doctor where, in the absence of specialised departments, cases of all sorts are thrust upon him in ever increasing numbers

TORSION OF VISCERA

Torsion of abdominal viscera is seen more frequently in the tropical areas of the world than in temperate areas This is because of the frequency with which volvulus of the sigmoid colon is seen, volvulus of the small bowel is also not infrequently encountered The association of chronic malaria and enlargement of the spleen in the tropics is well known and the occurrence of torsion of the spleen must be kept in mind in dealing with cases of abdominal distension in which an upper abdominal mass is detected Almost any abdominal structure may be twisted on its permanent attachment The essential changes seen in any form of torsion are displacement of the structure involved, interference with the blood supply of the pedicle, and upset of the function of the part involved All forms of torsion are associated with the presence of a narrow movable base to which is attached a comparatively large structure There is very frequently some obstructive element present concomitant with the twisting Marked fixity at one area and considerable laxity beyond this are seen in a high proportion of the cases Volvulus of the sigmoid colon is the most common form of torsion involving any part of the intestinal tract in most parts of the tropics Volvulus of the cæcum is rare, rotation of the transverse colon is exceptionally rare, volvulus of the stomach is least common of all Wilson [103] reports a case of gastric volvulus seen in East Africa, but comments on the rarity of the condition

Torsion of the small intestine, which is not very uncommon in female patients in the tropics, is in almost all cases a form of band obstruction The condition is usually caused by an adhesion placed between the posterior aspect of a piece of small intestine and the back of the anterior abdominal wall The adhesion is almost invariably attached to the posterior aspect of the anterior abdominal wall in a position above and to the right of a line corresponding to the attachment of the mesentery of the small intestine A very high proportion of cases of intestinal *obstruction of the small bowel due to band adhesions are situated to the right of* the middle line

Torsion of an enlarged spleen is less common than torsion of the sigmoid colon Rotation of an ovarian cyst on its narrow pedicle is also seen more commonly in the tropics than in Europe because of the later time at which patients go to hospital for treatment In many cases an ovarian cyst may have been present for a year or two before it became twisted By this time it has reached a large size in many instances Cases of strangulated ovarian cyst have been noted where

also and are very congested, the testis occupies a position in the scrotum higher than normal in most cases The angle of the testis in the scrotum in torsion cases is often found to be abnormal Torsion of testicle tends to occur more frequently in male children rather than in young male adults Vomiting is seldom seen in cases of epididymitis, but it occurs quite often in torsion of the testicle Extensive œdema of the scrotum may occur within twelve hours of the onset of torsion In the tropics it may be difficult to differentiate between thickening of the spermatic cord vessels, due to torsion, and funiculitis associated with guinea-worm infection in the layers of the cord The two conditions may be extremely like each other *It is advisable in these cases to ask the patient if he has had a guinea-worm infection* at any time about the legs, if the case is seen in an area where guinea worm disease occurs

The treatment of torsion of any organ consists in the operative rectifying of the condition as soon as possible Whether untwisting alone is sufficient or suitable in any case depends largely on the stage at which the case is seen In most cases of torsion of the ovary or spleen it is best to remove the involved structure In some cases of torsion of the testicle the structure is maldeveloped and abnormal, and is better removed In some cases untwisting may be sufficient It is desirable to fix the testicle so that further rotation does not recur

With sigmoid volvulus the condition can frequently be relieved by sigmoidoscopy if the condition is seen on the first or second day after the onset of symptoms If relief is not possible by sigmoidoscopy the abdomen must be opened and the large gut segment untwisted In late cases of this condition, where the gut is devitalised, the operative risk of any procedure is very high A Paul-Mikulicz procedure of exteriorisation is not a practical proposition in late cases of sigmoid volvulus The devitalised loop starts at a position which is close to the brim of the lesser pelvis and is so fixed that the lower healthy area at the upper part of the rectum will not reach the surface of the abdominal wall In these cases it is advised that the loop is untwisted and resected, the lower part is then closed and returned to the pelvis and the upper gut segment, which is part of the descending colon, brought to the surface with the clamp still on the colon In order to get the descending colon to the surface of the abdominal wall it is necessary to mobilise the structure which at this position is rather fixed to the posterior abdominal wall The clamp of the Payer's type should be left on the colon and not opened for forty-eight or seventy-two hours, preferably at seventy-two hours if the patient's condition will stand this A course of streptomycin should be given following operation A blood transfusion is also essential, if a transfusion is not given the patient will almost certainly die If the patient recovers, a large bowel reconstruction can be undertaken later

Volvulus of the small intestine is in most cases a variety of band obstruction The prognosis is bad in many cases It is essential before dealing with the case to give intravenous electrolytes, sodium chloride and potassium chloride also Gut resection may be possible in some of the cases If the patient's condition does not appear to be sufficiently good for a major resection, it may be wiser to undertake an ileosigmoid anastomosis as being the minimum operation consistent with relieving the bowel obstruction

of symptoms, the pain may be localised over the area of the affected structure, but by the second day the pain becomes generalised as in most abdominal conditions The history of the first eight hours is therefore most important and should be elicited carefully In any form of torsion of abdominal organs there is early interference with the blood supply of the structure involved A structure which has become rotated becomes very discoloured and congested, the involved area assuming a dark red or purple colour The veins being of lower pressure than the arteries, become obstructed sooner than the arteries, and this increases the tendency to congestion and serous exudate



FIG 51
Torsion of spleen as seen at operation

A Deitl's crisis of the kidney gives rise to severe abdominal pain This condition is closely allied to torsion, being a slight rotation of the kidney and pelvis of the ureter over an abnormal renal artery placed anterior to the ureter and at a position lower than normal The abnormal artery is the fixed structure precipitating the rotation of the upper ureter This condition is not common

The only other part of the genito-urinary system involved by torsion is a testicle, where the condition is noted on rare occasions There may be difficulty in differentiating between torsion of a testicle, epididymitis and funiculitis associated with guinea-worm infection in the area of the spermatic cord If a young adult male patient is found to have a very painful testicle and a urethritis is noted, the testicular condition is likely to be of inflammatory origin, secondary to the urethritis In cases of epididymitis the inflammatory area is well localised to the epididymis, the position of the testicle is low in the scrotum and the veins of the cord are usually normal In torsion of a testicle the veins are in a state of torsion

suspected as being the cause of the condition About 20 per cent of the patients die from the first attack of hæmatemesis, and a further 20 per cent with each subsequent attack—few survive five attacks Without treatment further attacks of hæmatemesis are likely to occur There is an increasing risk with each hæmorrhage Most of the patients with portal hypertension die within two or three years of the first attack unless treated surgically If œsophageal varices are suspected, they may be demonstrated by barium swallow X ray examination. The prominent varices give a characteristic indented outline to the barium shadow in the lower third of the œsophagus Following two weeks rest and sedatives after the hæmorrhage sustained, the patient's condition should be investigated Earlier investigation is likely to precipitate a recurrence of the hæmorrhage

In country stations, where radiographic facilities are not available, the patient can be examined by œsophagoscopy An emergency bronchoscope with U 2 electric batteries in the handle is very useful for this purpose (Longworth Ltd, Scientific Instruments, Abingdon, Berkshire, England) This examination is better carried out under general anæsthesia Gas, oxygen and ether is safer than chloroform mixtures or intravenous barbiturates in cases where liver damage is likely to be present Before the anæsthetic is started the patient should be given ½ oz of liquid paraffin to swallow, this helps to lubricate the œsophagus The instrument itself should, of course, also be lubricated before being passed The spleen is invariably enlarged in cases of portal hypertension It can usually be felt just below the rib edges on the left side If a spleen is palpable in this position it is usually enlarged to approximately three times the normal size If enlarged œsophageal varices are found and the liver and spleen are enlarged, it may be concluded with fair certainty that the case is one of portal hypertension The case should now be investigated further Some cause should be looked for to account for the condition

Huang and Chang,[101] considering portal hypertension, found that the site of the portal obstruction was within the liver in 85 7 per cent of their cases, while in 14 3 per cent of the cases the obstruction of the portal system was extrahepatic In South China approximately 80 5 per cent of the cases were considered to be due to schistosomiasis, with associated changes in the liver, while in North China about 80 5 per cent of the cases were considered to be due to Laennec's cirrhosis—that is, a fibrosis about the radicles of the hepatic veins leaving the liver They found splenomegaly in 100 per cent of the cases, but enlarged liver in only 37 per cent and ascites in 44 6 per cent The protein plasma level was found to be below normal in all cases Portal hypertension is usually considered to be a disease due to obstruction of the outflow of blood from the portal venous system at some point The obstruction may be at a point before the liver is reached, INFRAHEPATIC, or within the liver, INTRAHEPATIC, or in the area where the blood leaves the liver, SUPRAHEPATIC In view of the frequency with which portal hypertension in the tropics is associated with schistosomiasis, it would seem reasonable to consider the possibility of the pressure within the portal vein system being raised because of an abnormal arteriovenous communication either at the lower end of the system or within the liver

Cases of torsion of the spleen may be of an acute or chronic nature The case depicted in Fig 51 was seen and operated upon two days after the onset of symptoms, the patient recovered quickly following operation The next case seen of torsion of the spleen was in a female patient who had had symptoms of six weeks' duration If a chronic torsion of any structure occurs it usually becomes very adherent to surrounding structures due to the marked inflammatory reaction associated with the marked congestion present The prognosis in cases of torsion of the spleen is good as the bowel is not primarily involved There is usually not a lot of difficulty in removing a volvulus of the spleen, as in cases where this occurs the pedicle is almost always very long and mobile

PORTAL OBSTRUCTION, HYPERTENSION AND ASCITES

The incidence of liver disease of almost all sorts is higher in tropical countries than in temperate areas There is a very large number of causes of liver damage Many diseases seen affecting livers in the tropics are not encountered in non-tropical areas, while almost all those conditions seen in Europe and North America are seen in the tropics in addition Primary malignant disease of the liver is seen more commonly in almost all tropical countries than in temperate zones The presence of schistosomiasis accounts for a very high proportion of the cases of liver damage The schistosome group of diseases is limited almost exclusively to the tropics Liver damage of many sorts ultimately results in the production of cirrhosis, and following this portal hypertension and ascites develop These secondary syndromes may occur separately or in combination with each other

The situation is constantly arising in tropical hospitals of a middle-aged adult patient, usually a male, being admitted to the wards because of ascites, enlarged liver and spleen and in an ill condition The number of female patients with this type of illness is much smaller Most of the cases are initially admitted to medical wards for investigation and treatment Patients with enlarged liver and ascites are usually much more ill-looking than those with portal hypertensive hæmatemesis alone Portal hypertension is usually manifested initially by a sudden severe attack of hæmatemesis, the blood comes from enlarged œsophageal and gastric varices Prior to the hæmorrhage the patient may not have had any obvious indication of illness The bleeding is usually quite unexpected The diagnosis of portal hypertension depends on the finding of dilated œsophageal veins and the presence of enlarged liver and spleen In this condition there is a marked disturbance of the albumin-globulin relationship in the blood serum as a result of the liver dysfunction associated with portal cirrhosis There is also some degree of salt retention There is a variable degree of hypoproteinæmia also present The intravenous portal tension is found to be raised considerably above normal if measured in these cases at operation Porta-systemic shunt operations of various sorts are undertaken in the treatment of portal hypertension

About 20 per cent of cases seen suffering from hæmatemesis are due to portal hypertension The remaining 80 per cent are associated with bleeding from peptic ulceration of some sort If a patient sustains a sudden severe hæmatemesis in the absence of previous gastric symptoms of any sort, portal hypertension may be

difficult or impossible to carry out without the skilled assistance of a fully trained pathologist Shaper [107] has described the result of an investigation on patients in Rhodesia suffering from liver damage of varying degrees He used the test of Mallen and others [108] who, working in Mexico, compared the results of the method with the findings in the more complicated flocculation tests for abnormal protein relationships Woolf [109] also correlated the findings of the test with colloidal gold and albumin-globulin ratio tests This liver function test, suitable for tropical practice, is very simple, efficient and useful in country stations and merits attention This iodine test can be undertaken in a few minutes It consists in mixing a drop of the patient's serum with one drop of strong Lugol's solution The Lugol's solution is made up by using 20 gm of iodine with 40 gm of iodide of potassium dissolved in 300 minims of distilled water After mixing the serum and Lugol's solution the results can be read two minutes later they are as follows

1	Negative	Healthy liver	Mixture remains transparent, slight iodine tinge
2	Plus 1	Light liver damage	Mixture forms very fine precipitate
3	Plus 2	Medium liver damage	Mixture forms medium granular precipitate
4	Plus 3	Marked liver damage	Mixture forms heavy granular precipitate
5	Plus 4	Severe liver damage	Mixture forms heavy and almost black precipitate

The test depends on the presence of disturbed albumin-globulin ratio in the serum A control group of healthy patients showed negative results, two patients only out of forty in the control set gave a plus 1 or plus 2 positive result Probably in these patients slight liver damage was present but not giving rise to any known symptoms The test can be considered not less than 90 to 95 per cent accurate In a group of patients known to have liver damage present and clinically ill with portal obstruction, the results were as follows

1	Negative (minus)	Presumed healthy, 0 per cent
2	Positive (plus 1)	Very slight liver involvement, 4 per cent
3	Positive (plus 2)	Early definite liver involvement, 11 per cent
4	Positive (plus 3)	Marked liver involvement, 39 per cent
5	Positive (plus 4)	Severe liver damage, 46 per cent

If patients show some signs of portal obstruction one may reasonably suspect a degree of liver damage present Patients with a plus 4 reaction should be considered to be a prohibitive surgical risk, plus 3 damage, a high surgical risk, but plus 1 and plus 2 might reasonably be operated upon with a good hope of success

Various forms of porta-systemic shunt operations (Fig 52) appear to be most effective in the treatment of portal hypertension They may be undertaken with or without splenectomy In patients who develop portal hypertension there is a marked natural tendency to develop a spontaneous porta-systemic shunt of some sort, as seen at operation Various channels enlarge where there is a natural

Aird [105] has postulated the arteriovenous theory as a possibility Arteriovenous communications have been demonstrated in the lower vascular field between pelvic arteries and radicles of the portal vein Ibrahim [106] has indicated that free communications have been demonstrated between the branches of the hepatic artery within the liver and the portal vein sinusoids—virtually an arteriovenous fistula—as suggested by Aird If an arteriovenous communication exists the venous pressure will rise considerably The disease described by Banti, where a young subject is found to have a large spleen and ascites present, is due to subhepatic portal obstruction of some sort This may be of inflammatory origin, a portal phlebitis with thrombosis and venous obstruction or may be due to a congenital defect with failure of canalisation of some segment of the portal system

Two possible causative primary factors which may be productive of portal hypertension ultimately become apparent which are some form of portal obstruction or some form of abnormal communication between the arterial system and the portal venous system at some point With these two possibilities in mind, two surgical approaches can be made to the problem of treatment One is to relieve the portal obstruction by some sort of by-pass operation between the portal and systemic venous system before the obstruction is reached this approach constitutes the porta-systemic shunt operations of various sorts The other approach is to ligate the arterial blood supply at a point close to the arteriovenous communication

Before surgical treatment is considered in any case, medical means should be employed to ascertain the possible basic cause of the condition and treat this where possible It is necessary also to investigate the liver function and rectify if possible the low blood protein level and the blood chloride retention It is necessary to exclude the possibility of the condition being associated with malignant disease A primary or secondary neoplasm pressing on the hepatic veins and obstructing the return flow of blood from the liver to the systemic system may give rise to an acute or certainly subacute portal hypertension with ascites This condition, when it develops rapidly, is known as the Budd-Chiari syndrome In cases of ascites, peritoneal fluid can be removed very easily for examination If the fluid is blood-stained the ascites is, in a high proportion of the cases, due to malignant involvement of the liver It is possible by needle biopsy to remove sufficient tissue from a liver for microscopic section The Vim Silvermann type of needle is recommended for this procedure This type of needle has been used on a few occasions without any obvious indication of internal hæmorrhage having taken place Malignant disease and schistosomiasis may be detected by needle biopsy in many cases

If cirrhosis is present its type can be ascertained The Bolan's blood slide test for malignancy as described in Chapter 2 may be very useful It is advisable in any case of liver damage to undertake some test to ascertain the degree of liver deficiency An operation of any sort affecting the vascular supply of the liver may be highly dangerous in a patient whose liver function is poor Where very limited facilities are available it is obviously desirable to have some simple and reasonably efficient test which can be undertaken by the doctor in charge of the hospital himself Many of the tests in use for liver efficiency are complicated and

omentonephropexy in the treatment of portal *hypertension* It is presumed that part of the surface of the peritoneum covering the kidney is removed, as well as part of the kidney capsule, to increase the possible union between the omental and renal blood supplies These cases were reported in 1957 and the results initially seemed favourable From personal experience it seems that the results of these crude shunt methods are very variable In six cases so treated some years ago, two cases were dramatically improved—they were undertaken for ascites secondary to non-malignant portal obstruction, three cases were definitely better and one case filled up again soon after the wound had healed with the formation of an incisional hernia A calculated porta-systemic shunt operation is a sounder procedure if it can be undertaken

Lan, Yao and Chien [111] consider that whereas splenorenal shunt operations are most suitable in cases of portal hypertension, in a limited group of patients where the patient is in poor condition or a shunt is considered difficult to perform, advantage may be gained by the insertion of a "double-ended button," rather like the old-fashioned Murphy's button for intestinal anastomosis, placed in the abdominal wall By this simple method many patients were greatly improved as the ascitic fluid was allowed to drain away into a subcutaneous pocket in the superficial tissues and be absorbed The method is again virtually a shunt of a type The virtue of the operation is that it is a very low-risk procedure, suitable for patients unfit for the more major procedures The opening within the button may no doubt close slowly with granulation tissue Two-thirds of the patients seemed permanently benefited by the procedure A plastic spool might well be used for the purpose of this operation

Garcia,[112] working in the Philippine Islands area, noted that in 90 per cent of his cases of portal hypertension the obstructive lesion was within the liver In only 10 per cent of the cases was the obstruction extrahepatic If a portal obstruction is extrahepatic the liver function is usually good and the operative risk is low Extrahepatic obstruction is seen typically in cases of congenital obstruction of a section of the portal vein as in Banti's disease In some adult cases neoplastic extension may occur into the veins of the portal system It has been suggested that a chronic ascites might be drained by anastomosing the upper end of the ureter to the peritoneal cavity after nephrectomy By this method the ascitic fluid would be passed into the ureter and bladder and so per urethra The continued loss of protein associated with this technique does not commend the method Garcia found that the most convenient and efficient form of porta systemic shunt operation was the splenorenal vein procedure following splenectomy

The criteria for judging the suitability of a patient for porta-systemic operation are

1 That the patient should be under 50 years of age
2 The heart and kidneys should be in good condition
3 The serum albumin should be above 2 5 cm per cent
4 The Lugol's iodine test should be preferably below plus 3

Huang [113] also, working in China, found that the splenorenal anastomosis was the most suitable for a shunt operation, it was the easiest and the most efficient

communication between the portal and the systemic venous circulation The œsophageal varices which characterise portal hypertension are only an indication of a naturally developing by pass mechanism The communication between the superior hæmorrhoidal veins of the portal system and the inferior and middle hæmorrhoidal veins which drain into the systemic circulation also increases markedly Marked hæmorrhoids are frequently seen in these cases The liver

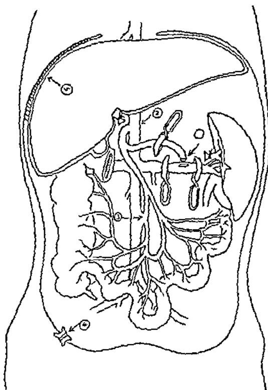


FIG 52
Diagram illustrating porta systemic shunt operations

develops massive adhesions between its upper surface and the under surface of the diaphragm The omentum tends to become adherent to the abdominal wall

There are many names associated with operations designed to produce a shunt device of this sort as a calculated procedure, the names of Talma and Morrison being associated with the formation of an "adhesion" shunt between the liver and the diaphragm, and suturing of the omentum into the abdominal wall The production of adhesions between the surface of the enlarged spleen and the diaphragm has the same purpose, this has also been suggested as a method of treatment Both of these operations were suggested about A D 1900 Implantation of omentum into the retropubic space also gives good results More recently Logatcheva[110] has advocated splenectomy combined with

impossible or extremely difficult, that ligature of the hepatic artery *might be* undertaken with advantage and much greater ease as an alternative procedure if the patient's condition is sufficiently good to warrant this

The ligature of the hepatic artery is a comparatively simple operation as compared with the shunt operations, which may be very difficult Ruggieri,[114] in treatment of portal hypertension in liver cirrhosis by ligature of the hepatic artery, undertook measurements of the portal vein tension during operation The initial pressure in the portal vein was in one case 29 7 cm of water After splenectomy it fell to 20 7 cm of water, and after ligature of the hepatic artery in addition, it fell to 11 4 cm of water, the total decrease being 18 cm of water approximately In a further case the initial portal pressure was 37 cm of water Following splenectomy in this case the portal pressure fell to 26 cm of water and after ligature of the hepatic artery in addition it fell to 20 4 cm of water In this case the total fall in pressure was 16 6 cm of water, roughly the same as in the other case (Fig 70) With this marked fall in the portal pressure it is understandable that the outflowing of lymph and the formation of ascites is markedly reduced The only question is whether with this drastic treatment the liver function is not grossly interfered with or if there is no risk of gangrene of the liver

Khairy,[115] working in Egypt, where many cases of portal cirrhosis are seen associated with portal hypertension, carried out a series of cases of ligature of the hepatic artery He is of the opinion that ligature of the hepatic artery is the best method of stopping ascites The operation was not followed in any case by necrosis of the liver as one might suspect In some cases of ascites the portal vein pressure is not much raised, but in most it is considerably higher than normal Ligature of the hepatic artery should not be attempted where there is a marked hypoproteinæmia This can be tested by the iodine test, which is a test for disturbed protein balance in the serum In any case where there is hypoproteinæmia, preliminary medical treatment should certainly be undertaken before any surgery is performed If after treatment along conservative lines the patient's condition is still not good, one of the minor procedures should be considered with a view to relieving the ascites, such as the " button drainage " technique

Increase in protein in the food may greatly improve patients suffering from hypoproteinæmia Salt retention, which occurs in these cases, should be counteracted by decreasing the salt intake It has been suggested by Conn[116] that in these cases there is an increase in the salt-retaining hormone in the blood called aldosterone

The figure given for the mortality rate following ligature of the hepatic artery for portal hypertension varies from 7 to 30 per cent with a possible average round 20 per cent Considering that the patients are suffering from a very serious and often grossly neglected condition, when first seen at hospital, this figure is not unduly high No doubt the lower figure corresponds to a series where very careful selection of the cases was made before surgery was undertaken Ibrahim,[106] working in Egypt, noted that a large number of cases of hepatosplenomegaly were due to schistosomiasis In these cases a marked perisinusoidal fibrosis occurred He considered where the liver is enlarged the results are better when the hepatic artery is ligated than when a porta-systemic shunt is performed as a means of

You are dealing with a fairly large vein, the spleen is removed The splenic vein can be caught lightly in a clamp and brought down to the top of the renal vein on the left side The left renal vein can be temporarily occluded during the performance of the anastomosis Small Dieffenbach's clips of about 2 in long can be used instead of long clamps, these small clips are very convenient, as there are no long handles to get in the way The junction formed between these veins is very like that made in a ureterosigmoid anastomosis, as carried out by the Nesbitt technique The clamps should be applied very lightly in order not to damage the veins, otherwise thrombosis of the veins may occur Having carried out a limited number of these operations myself, the following observations can be made The tissues surrounding the portal vein in the gastrohepatic omentum just above the duodenum are far from normal in cases requiring the operation It is much more difficult to carry out a porta-systemic shunt operation in a patient who requires it than it would be in a patient who does not require it The operation is not so easy as it would appear from the diagrams in textbooks indicating the procedure to be undertaken

A portacaval shunt is much more difficult than a splenorenal shunt By the time the superior mesenteric vein becomes sufficiently large to anastomose it to the vena cava with any ease, it is at the level of the head of the pancreas and beneath the stomach It is in this position surrounded by dense areolar tissue so that there may be considerable bleeding in endeavouring to isolate it The vena cava at this position is also becoming very fixed in dense retroperitoneal tissue It is difficult to apply clamps where they are required, and there is little doubt that many operations undertaken in this area start in hope and end in despair Having failed to isolate the appropriate veins in this position on occasions, it has been found not unduly difficult to undertake a side-to-side anastomosis between the superior mesenteric vein and the vena cava at a lower level This procedure is in the nature of the production of an Eck's fistula The patients seemed to be satisfactorily improved by the operation It is advised that, certainly for the first few cases attempted, the splenorenal anastomosis following splenectomy should first be undertaken, it will be found much easier than a portacaval shunt

Ascites secondary to hepatic fibrosis is more common than portal hypertension alone The two conditions may coexist, their pathology being closely linked Whereas porta-systemic operations of the shunt type are satisfactory for portal hypertension, ascites does not necessarily appear to be relieved in all cases by venous blood shunts There is a general tendency in recent years, as indicated by articles appearing in the world literature, to consider that the formation of ascites is closely associated with a high tension in the hepatic artery and that the high arterial tension is communicated through abnormal sinusoids in the liver to the portal system, there being, however, in addition, a marked outpouring of lymph-like fluid with production of ascites due to the high arterial tension in the hepatic artery Ligature of the hepatic artery has been undertaken, with increasing frequency, as a treatment for both ascites and portal hypertension The results in properly selected cases appear extremely good It should be kept in mind in cases where a porta-systemic shunt is anticipated, and this is found either

SPLENIC ABNORMALITIES

The physiology and pathology of the spleen have given rise to much speculation and controversy from time immemorial It is desirable here to bring together the well-established principles of surgical pathology which will consolidate the subject in a concise and practical manner, giving guidance to doctors working in the tropics who are faced with the problems of splenic abnormality The question of pathology is of little import in patients who sustain a rupture of the spleen or an acute abdominal emergency due to torsion of the pedicle Both conditions are undoubtedly best treated by removal of the spleen The only questions which arise are those of early diagnosis and the best method of operative approach It is necessary to assess accurately the patient's condition and his fitness to stand such an operation This matter will be discussed after consideration of the many abnormalities of the spleen which are commonly called medical conditions

The spleen is largely a recticulo-endothelial structure associated with the regulation of blood formation and destruction It has also other important functions The hæmopoietic tissues of the body are situated largely in the bone marrow, they are to a lesser extent also lodged, in early life particularly, in the spleen After early childhood the bone marrow tissue becomes the most important blood-forming mechanism That the spleen has some capability of continued blood formation even in adult life is indicated by the observation that regeneration of blood is much more rapid in patients subjected to X-radiation if the spleen is protected during exposure One of the many important functions of the spleen is to remove cellular elements from the blood after the individual cells have served their allotted term of service If the production of the blood cellular elements is balanced by the rate of removal of these structures by the spleen a healthy equilibrium is maintained Considering the three most important cellular elements in the blood relative to their rate of production and subsequent disposal, three definite diseases are known where a disturbed balance occurs If the spleen is overactive, destroying either red cells, white cells or blood platelets more quickly than normal, three conditions may be produced, namely

1. Splenic anæmia, red cells being destroyed more rapidly than they are produced
2. Splenic neutropenia, where there is an excessive rate of destruction of leucocytes
3. Essential thrombocytopenia, where blood platelets are being excessively rapidly destroyed

In this latter condition the characteristic purpuric syndrome is produced with a tendency to petechial hæmorrhage, prolonged bleeding time and impaired blood-clot retraction Before concluding that there is an overactivity of the spleen in destroying any of these blood elements it is necessary to prove that the rate of of production of blood cellular elements is within normal limits To establish the normality of the hæmopoietic tissues beyond doubt, it is necessary to undertake a bone-marrow biopsy Microscopic examination of stained bone marrow may

relieving the liver itself Porta-systemic shunts are more suitable for cases of hæmatemesis Ligature of the hepatic artery is better for ascites cases Portacaval shunts have been looked on with some disfavour in Egypt because of the risk in cases of schistosomiasis of the infection spreading to the lungs Schistosome ova may be carried from the lower portal vein radicles through the anastomosis into the systemic veins and so to the lungs A fair number of cases were noted where post-operative acute pulmonary congestion occurred

On microscopic examination of liver tissue free communications have been demonstrated between the hepatic artery terminals and the portal vein sinusoids which amount to a virtual arteriovenous aneurysm This pathological communication allows of a raised pressure being communicated to the portal system Six patients operated upon for ascites by ligature of the hepatic artery were seen six to twenty-five months after operation, and in all cases the patients were free from ascites In cases where the patient's condition is not considered entirely satisfactory, it might be feasible to ligate the gastro-hepatic artery, by this means the main hepatic artery would be decreased in pressure but not completely occluded as a small quantity of blood count enters it in a retrograde manner via the gastro-duodenal branch It is considered advisable to give penicillin to all patients undergoing operations for portal hypertension and ascites because of the increased risk of infection associated with the hypoproteinæmia and liver damage

The following observations are made by Ibrahim [106]

1 Ascites can be cured by ligature of hepatic artery
2 The mortality was 7 per cent in this series undertaken
3 Ligature of the hepatic does not necessarily cause damage to the liver cells
4 There is a marked drop in portal hypertension following this operation
5 The operation is much easier than a porta-systemic shunt procedure
6 Splenectomy should not be undertaken at the same time as hepatic artery ligation

It should be kept in mind in view of these observations that alternative methods exist in the treatment of portal hypertension and ascites If one is unduly difficult the other may be undertaken more easily

Any patient who has jaundice when first seen should be considered unfit for surgery on the vascular system affecting the liver All such cases require very careful investigation If the jaundice is due to non malignant biliary obstruction, surgery may in some cases be indicated on the biliary tract but vascular surgery should not be undertaken

The radical approach to the treatment of ascites by surgical methods gives considerable promise of relief to many patients in the tropics which have hitherto been considered to be in a hopeless condition The prognosis in cases of ascites due to liver cirrhosis treated by means other than surgical is, so far, very poor Medical measures should, however, not be neglected in preparing patients for surgery, adequate co-operation is required between all sections of the staff in dealing with this group of seriously ill patients

usually of a temporary nature, as is seen in typhoid fever and many other forms of septicæmia No cases of splenic abscess have ever been encountered personally —they appear to be rare In areas of the world where malaria is endemic, enlargement of the spleen may also be said to be endemic, the two being closely associated Some enlargement of the spleen in children in a malarious district is present in probably 100 per cent, but as the spleen cannot be palpated until it is at least three times its normal size, it is usual to find only about 30 to 40 per cent of the children of school age with a palpably enlarged spleen There may be much enlargement of the spleen in both histoplasmosis and toxoplasmosis—both rare conditions

Two most instructive records have been published in both Yugoslavia [118] and the Netherlands [119] by Skrabalo concerning the same patient They illustrate the beneficial protective mechanism of the spleen against infective disease The patient seems to be the first human subject in which piroplasmosis has been recognised Piroplasmosis is a protozoal infective disease affecting various animals and it is transmitted by ticks A very neat-looking parasite, not unlike quartan malaria " rosettes " to the eye, as seen in slides at a veterinary department, are found in the red blood cells Various animals may develop the disease with many manifestations of the condition "Redwater fever" in cattle is characteristic of the condition, the malady being so named because of the hæmoglobinuria produced All efforts to infect man experimentally with this disease up to the present have failed In this first recorded case of infection in man by piroplasmosis, the circumstances relative to the part played by the spleen is most instructive The patient, a farm labourer, became involved in a street fight in Zagreb in Yugoslavia about 1941 He sustained a rupture of the spleen and this was treated by splenectomy Following uneventful recovery, he maintained good health for ten years On developing an illness for which it was difficult to find a cause, piroplasms were ultimately found in the circulating blood cells With herdsmen working amongst infected cattle (as he was) one might have expected them to develop the infection following the bite of infected ticks, but this has not been the case The spleen seems to be the protective mechanism in preventing humans from developing the disease Defence against infection has been held as one of the functions of the spleen for many years In this case, no doubt, the accident, followed by removal of the ruptured spleen, was the predisposing factor of a patient developing piroplasmic infection Unsworth [120] found that trypanosomes could be repeatedly subcultured in mice which were splenectomised, but that the culture could not be maintained if mice were used from which the spleen had not been removed The presence of a spleen seems to be detrimental to the longevity of the experimental trypanosomes

Walters,[121] reporting on a young male patient from a seaside village in South Kombo, Gambia, found that a chronically enlarged spleen associated with ill-health was due to kala-azar Donovan-like bodies were detected on microscopic examination of material removed from the spleen by splenic puncture Obvious manifestations of leishmaniasis have not been found in Gambia, though several cases seen there personally in 1936 suspected of suffering from the condition

detect its normality or otherwise Coombs' serum test for auto-antibodies is supportive evidence of overactivity of the spleen This test is a method whereby red cells are detected which have been coated by an antibody substance, the antigen of which is contained in the red cells themselves It is a complicated laboratory procedure beyond the skill and facilities of the average doctor not undertaking pathology exclusively If it can be proved that the bone marrow is normal and the peripheral circulation contains less than normal numbers of any of the individual blood cellular elements, it may reasonably be concluded that the cells are being destroyed at an abnormally high rate by an overactivity of the spleen, which is the principal site of destruction of these cells It is therefore reasonable, if these conditions can be confirmed, to remove the spleen Splenectomy is therefore indicated in splenic anæmia

Dodu and Edington[117] reported a case of this type in the Gold Coast where the condition was improved by splenectomy Splenic neutropenia and splenic thrombocytopenia are also effectively treated by splenectomy These three conditions make up the "Hypersplenic Disorders," as they are sometimes termed In congenital hæmolytic anæmia the spleen itself may not be overactive but the subject's red cells are abnormal, possibly a normally working spleen destroys them because they are of abnormal fragility Splenectomy for congenital hæmolytic anæmia arrests the condition satisfactorily and is therefore beneficial Patients suffering from this condition if not treated surgically are very liable to form pigment gall-stones early in life due to an excess of circulating blood pigment, which is excreted by the liver

In cases of leukæmia, both myelogenous and lymphatic, there is a marked enlargement of the spleen associated with a tremendous excess in the formation of white cells of the corresponding types The spleen enlarges in its efforts to *remove the excess of white cells from the blood The essential pathology is in* the nature of a neoplastic process of the hæmopoietic tissues The leukæmias are diagnosed from the examination of the peripheral blood It is seldom necessary to confirm the condition by marrow biopsy In very early cases where the condition is suspected only, marrow biopsy may be helpful It is of interest to note that following a splenectomy for rupture of the spleen there is a very marked temporary rise in the number of circulating leucocytes in the blood This is thought to be due to the temporary lack of balance between production and removal of the cells Within one to two months the position adjusts itself The observation is, however, of interest as indicating the necessary balance between the production and disposal of cellular elements

Why a spleen should suddenly or gradually become overactive at any time is not obvious The hypersplenic conditions usually become manifest in children or in young adults *It is obviously necessary to ascertain the cause of enlargement* of the spleen before it is reasonable to consider its removal on grounds of size alone Slight enlargement of the spleen may not necessarily be disadvantageous It is usual in many forms of bacterial and protozoal infection to find the spleen enlarged Slight enlargement may indicate its activity in the mechanism of maintaining health A list of causes of enlargement of the spleen may be found in most medical textbooks Enlargement of this organ due to bacterial infections is

rather silent nature, giving rise to slow enlargement Because of the slow rate of enlargement there may be some calcification in the capsule X-ray examination may therefore, in some cases, be a help It should be remembered that echinococcal cysts are seldom single in the body and this should be considered in instituting treatment If it is concluded that such a cyst is a solitary manifestation of hydatid disease, it would seem eminently suitable for extirpation complete by splenectomy Cases of this nature affecting the spleen have not been encountered personally No case of splenic abscess has been seen on any occasion

In malaria the spleen seems to decrease in size in most cases in adult life though not in all Splenectomy is seldom undertaken for enlarged spleen of malarial origin On rare occasions a spleen may be of enormous size and become a potential danger because of the tendency to rotate If after prolonged and adequate antimalarial treatment the spleen does not retrogress in size, splenectomy may have to be considered for the comfort of the patient

If spleen puncture is considered desirable for diagnostic purposes, a Silverman's biopsy needle should be used for this purpose This needle is made by the Vim Company Ishak and others [173] undertook spleen puncture using this form of needle in a series of fifty cases in Egypt without any fatalities It is difficult to remove spleen tissue using an ordinary exploring needle and syringe attached, even though suction is applied, on withdrawing the needle no tissue may be obtained, a small quantity of blood only being found in the mouth of the needle Hæmorrhage following this form of biopsy may be predisposed to by a patient taking a sudden gasping breath due to the discomfort of the insertion of the needle If the needle is inserted at right angles to the surface of the body, a considerable tear may be encountered as on inspiration the spleen descends at right angles to the line of entry of the needle In most ceses where spleen puncture is desirable the spleen is enlarged and there is no difficulty in inserting the needle from below upwards If with the needle in the almost vertical direction the patient does take a deep breath there is no great risk of a tear, as the enlarged spleen is applied to the lateral thoracic and anterior abdominal wall far out on the left side of the body and the fingers of the left hand can be pressed in beneath the spleen to steady the superficial tissues before insertion of the needle As the needle is of rather a large size, it is desirable to use a local anæsthetic in the skin and tissues of the abdominal wall, so that they can be punctured without undue discomfort by the sharp point of a narrow-bladed scalpel prior to the entry of the needle The patient should be given a strong sedative before needle biopsy of the spleen A general anæsthetic is usually not necessary nor desirable The procedure should be undertaken only in hospital The patient should be kept under observation for not less than three days following the puncture

Torsion of the spleen may result in sudden acute abdominal symptoms or may be of the low-grade chronic type, recurring at intervals, where a much-enlarged spleen suspended on an elongated pedicle moves more freely than normal in the upper left quadrant of the abdomen The onset of sudden upper abdominal pain associated with shock and vomiting as well as marked abdominal distension are suggestive of the condition if, in addition, a solid tumour can be felt in the centre of the abdomen The site of the attachment of the mass may give an indication

had tissues removed from chronic ulcers about the upper part of the forearm and sectioned Reports received on more than one occasion suggested that the appearances were very suggestive of leishmaniasis, but that Donovan-like bodies could not be found in the sections This case reported by Walters is therefore of considerable interest

In view of the frequency of sickle cell disease in patients of African origin, it is important to consider some facts regarding the pathology of the spleen noted in this condition It may not be easy in African patients suffering from sickle cell disease, who have in addition chronic malaria to decide accurately to what degree the splenic enlargement may be due to malaria or how much the sickle cell entity influences splenic changes There is some enlargement of the spleen in this condition during childhood and early adult life One patient aged about 24 years was seen in rather a collapsed condition suffering from very severe pain in the upper part of the abdomen on the left side There was marked abdominal distension present An intussusception was suspected and a laparotomy was undertaken, it was found that there was a large congested segment in the spleen but no intussusception No doubt the condition was due to a splenic infarction The patient's blood was examined post-operatively, and it was found to contain a large number of sickle cells The case was one of sickle-cell abdominal crisis associated with splenic infarction The abdomen was closed The blood should have been examined for sickle cells before operation, this occurred in 1941, at a time when the seriousness of sickle cell abdominal crisis was not fully appreciated This case brought the situation abruptly to notice and much greater care was subsequently exercised where sickle cell crisis might account for severe abdominal symptoms

It is not an advantage to remove a spleen in sickle cell disease The general tendency in sickle cell disease is for the spleen to become gradually fibrosed and shrunken following repeated attacks of infarction Findlay, Boulter and McGibbon [122] carried out experiments with persons known to have sickle cell disease in which the patients were flown at various altitudes in non-pressurised aircraft and examined following this Splenic infarction occurred in some cases and there was obvious evidence of sickle cell crisis if an altitude was reached where there was a slightly lowered oxygen tension

Consideration has already been given in the previous section to the position of splenic enlargement in the management of cases of portal hypertension and ascites The removal of an enlarged spleen in cases of portal hypertension markedly relieves the burden of blood entering the liver through the portal vein and hence is beneficial in the treatment of this condition Splenectomy is usually combined with a porta-systemic shunt of some sort which establishes a by-pass mechanism for blood otherwise compelled to go through the liver against some degree of obstruction An enlarged spleen in itself does not give rise to ascites With a congenital obstruction of part of the portal vein system, as seen in Banti's disease, there is, however, an enlarged spleen and ascites Splenectomy is beneficial in this condition, which is very comparable to a state of thrombosis of the splenic vein in young children

On rare occasions localised pathology within the spleen may be noted, such as hydatid disease, where a single cyst is found The condition is usually of a

through the spleen from in front *Early diagnosis of internal hæmorrhage* is essential if early treatment is to be instituted The value of the "tilt test" has been indicated in the section dealing with rupture of abdominal organs It depends on the accentuation of the rate of acceleration of the pulse as a result of alteration of the position of a patient suffering from hypovolemic shock, from the horizontal to an angle of 75 degrees In view of the necessity of replacing blood as soon as possible after its loss, early detection of internal hæmorrhage is essential If the internal hæmorrhage is so massive that symptoms develop indicating advanced shock within one or two hours of the receipt of the injury, cases almost invariably die, unless blood is immediately available for transfusion replacement from a blood



FIG 53
Operation of splenectomy for rupture of the spleen

bank or from relatives Most patients who recover from internal hæmorrhage secondary to rupture of the spleen are those in which the symptoms come on slowly If symptoms of internal hæmorrhage are not obvious on the first day, it is likely that the hæmorrhage has occurred from a rupture which is not very extensive (Fig 54) Operation in these cases is almost always successful

Hsu and Hsiao[176] found that where there was doubt as to the diagnosis of ruptured spleen the two most valuable methods of arriving at an early diagnosis were radiography and aspiration of the abdomen for the detection of free blood On X-ray examination the patients with ruptured spleen showed a raised dome of the diaphragm on the left side above that of the right side, the reverse of the normal findings in health Blood can be aspirated from the peritoneal cavity at a much earlier stage than it can be detected by a palpable "succussion wave" A succussion wave due to blood in the peritoneal cavity is a sign which occurs only at a late stage of internal hæmorrhage when blood loss exceeds 30 oz

as to whether the tumour is derived from the upper or lower abdomen Torsion of the spleen and torsion of an ovarian cyst give rise to very similar symptoms and signs Some consideration has already been given to this subject in the previous section If a spleen is enlarged and abnormally mobile in position, one of the splenic veins may be torn by excessive exertion, in such case indications of internal hæmorrhage follow this accident Early operation should be undertaken

While preparing this section on abnormalities of the spleen it is of interest to note that the first operation for removal of a spleen, in the human subject, was undertaken by Gustav Simon [124] one hundred years ago, in 1857 Splenectomy in animals had been undertaken prior to this time Spencer Wells,[125] of artery forceps fame, undertook the first successful splenectomy for congenital hæmolytic anæmia in 1887, but three earlier attempts were unsuccessful With the general increase of knowledge of surgical technique and a much better appreciation of surgical pathology, the indications for splenectomy have been more accurately clarified Removal of the spleen has been employed with increasing frequency from year to year Removal of the spleen in temperate areas of the world is employed largely for the treatment of blood disorders and portal hypertension, whereas in the tropics much the greater number of operations is undertaken because of rupture of this organ following injury (Fig 53) Rupture of the spleen occurs most commonly in the tropics following lorry accidents or crushing injuries by moving trucks On rare occasions rupture of the spleen may occur spontaneously during pregnancy in female patients in the tropics Several such cases have been reported What is considered a "spontaneous" rupture is probably in fact a rupture due to minor trauma in a much softened spleen due to chronic malaria

A type of case which may give rise to difficulty is that in which there is a "delayed' rupture of the spleen Such a case was seen where a young child with a fractured femur and multiple bruises following a lorry accident was admitted to hospital The gravity of the fractured femur detracted attention from other apparently lesser injuries The broken leg was treated in traction extension, progress appeared satisfactory and the child played with small toys while lying on her back in bed, being reasonably comfortable after a few days During visiting time about one week later the relatives, endeavouring to make the child more comfortable, adjusted her in bed One hour after visiting time the child died At post-mortem examination an extensive rupture of the spleen was found The appearance of the blood within the abdominal cavity suggested that there had been an undetected early rupture which had not been fatal, followed by a secondary "delayed rupture" There was much dark clotted blood about the spleen area, there was, however, in addition, bright blood of recently shed origin present It seems likely that moving the child about in bed precipitated the further hæmorrhage which was fatal

A high proportion of cases of rupture of the spleen die Many of these cases have other associated severe injuries Whereas some cases of splenic rupture follow direct injuries over the site of the spleen, others occur where there has been a blow on the anterior abdominal wall In these cases almost invariably the diaphragmatic surface of the spleen has burst due to pressure being transmitted

one overhead light available, as is usually the case in country stations, the maximum illumination does not enter the field of operation from above It is necessary to have a movable floor-light available if a lateral wound is used If a floor-light is used it is difficult to so place it that the light does not shine into the operator's face as well as into the wound With laterally placed wounds the intestines are very liable to "fall out" of the wound and have to be pushed back repeatedly, they may even touch a non-sterile part of the abdominal wall or the table unexpectedly A lateral type of wound is much more difficult to suture up satisfactorily than a vertical midline incision There is a tendency to think that the lateral incision will be more useful because the outer end is closer to the position of the spleen As, however, the spleen pedicle is in many cases quite lax, the spleen can be easily delivered out through the vertical incision as is seen in Fig 53 It is much



Fig 55

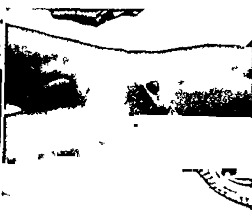


Fig 56

Fig 55—Optimum incision for removal of the spleen
Fig 56—Alternative incision for removal of the spleen

easier to ligature the spleen pedicle through the vertical wound than through the lateral incision If a ligature slips while working through a lateral incision, it may be extremely difficult with poor illumination to catch the bleeding vessel a second time For this reason the vertical incision is a safer incision to use

The lateral approach has a further disadvantage in that it does not hold a self-retaining retractor so well as the vertical type of opening With any form of lateral incision considerable difficulty may arise if it is found that in addition to the ruptured spleen there is some other intra-abdominal injury present requiring surgical attention, it is impossible to repair or deal with injury on the right side of the abdomen through a left-sided incision The midline is an obvious and simple compromise which permits of much greater facility and latitude in dealing with any condition which may be present in addition to the ruptured spleen Some operators add the lateral incision to the vertical, which seems very unnecessary The advantages of the midline incision may be summarised as

1 It permits of better illumination of the field of operation in ruptured spleen cases
2 It avoids the spilling of blood unnecessarily on opening the abdomen

approximately in an adult If not present at the time a patient is first seen, other methods of diagnosis should be employed It is necessary to exercise caution when dealing with a case of ruptured spleen to note if any other form of internal injury is present due to the accident sustained by the patient In one case of ruptured spleen, as a result of a stab wound of the left loin, a patient was found to have four perforating wounds of two loops of the small intestine At operation the spleen was removed and the piece of damaged bowel resected and the ends anastomosed The patient recovered quite quickly

Many different incisions have been advised for the removal of ruptured spleen, and having tried all of these over several years the following conclusions have been



FIG 54
Spleen which has been removed showing minor rupture

reached An upper abdominal midline incision (Fig 55) is most suitable, it is better than a subcostal incision or an incision in the line of the intercostal nerves proceeding from the lowermost point of the ribs to just below the umbilicus (Fig 56), and for the following reasons if the case is one of rupture with extensive internal hæmorrhage, it is imperative to give the patient a blood transfusion at the time of operation or the patient will die In most parts of the tropics the limited supply of blood available or the entire lack of it from a blood bank or available relatives necessitates using the patient's own blood for autotransfusion An upper abdominal midline incision being placed at the highest point of the abdominal cavity with the patient lying in the horizontal position prevents losing blood on the table when opening the abdomen In any incision placed between the midline and the lateral aspect of the body the major part of the blood is spilled and lost on opening the abdomen through the lateral part of the incision Efforts to collect the blood as it leaves the wound are unsatisfactory

A further major disadvantage of any form of lateral incision is that with only

be a very large amount of fatty omental tissue involved in the pedicle, which, of course, there is, by *opening the lesser sac* as a designed approach, the splenic vessels can be picked up with precision before withdrawing the spleen from the abdominal cavity

In ligating the splenic vessels it is advised that thick thread be used, linen or cotton is very satisfactory and does no harm in this position, it also is not at all likely to slip Thread as a ligature material for deep *pedicles is much safer than* catgut Two overturns should be put on the first knot and one on the second In some cases there may be many adhesions present between the lower surface of the diaphragm and the surface of the spleen These adhesions can be separated in almost all cases quite easily by insinuating and rotating the hand between the spleen and the diaphragm There may be a little oozing of blood following this, but the vessel seldom requires ligation There are no large vessels in these adhesions All vessels, other than those in the pedicle, can be arrested by the *application of a hot abdominal pack*

After the spleen has been removed a considerable amount of blood can be collected from the recess formed by the under surface of the diaphragm, if the patient is tilted into a slight Trendelenburg position It is a help to use a suction apparatus if available A stainless-steel ladle should be kept in all theatres for the purpose of collecting intra-abdominal free blood in cases of internal hæmorrhage, it is most useful and non traumatising to local structures Two to three ounces can usually be collected per scoop, which is as fast as any suction apparatus will withdraw fluid Patients have on no occasion been noted to suffer any disadvantage following the loss of a spleen In very many of the cases operated upon the presence of small splenules has been noted about the peritoneal surfaces close to the spleen pedicle

Patients following this operation almost invariably heal by primary union *There is minimal trouble with the wounds* Patients appreciate being given tonics following operation, in view of the fact that they have lost much blood by the nature of their condition It is not infrequently intimated to them by the nursing staff that they have lost a considerable amount of blood, to indicate to them that they are fortunate to be so well following such a serious accident

PRIMARY CARCINOMA OF THE LIVER

In view of the frequency with which primary carcinoma of the liver is seen in tropical countries it seems worth giving the matter some consideration, in spite of the bad ultimate prognosis Adult male patients are not infrequently referred to surgical departments because of a painful enlarged liver of some months' duration Ascites is present in addition in many cases The patients may be referred with the tentative diagnosis already having been made quite correctly The cases require examination and investigation before an accurate diagnosis can be established There are many conditions which may give rise to these physical signs of enlarged painful liver and ascites It would be unfair to turn such patients away from hospital without investigating their condition adequately, even though the early impression is gained that the outlook is at least very poor

3 It holds a self-retaining retractor better than a lateral incision
4 There is less tendency for the intestines to fall out of the wound
5 It permits of ligation of the splenic pedicle under more direct vision
6 The wound can be sutured more easily than when a lateral incision is used
7 There is no liability of damage to intercostal nerves
8 The maximum quantity of blood can be collected from within the abdomen
9 Other internal injuries if present can be dealt with easily through it
10 If the diagnosis of ruptured spleen is not correct the lateral incision is of little use in dealing with other conditions such as ruptured liver
11 Patients who have had for other reasons both central and lateral incisions say that the former are much less painful

Many patients with ruptured spleen are in very poor condition on arrival at the operating theatre It is desirable, if no donor blood is available before operation for transfusion, that an autotransfusion be started as soon as blood is available on opening the peritoneal cavity It has been found very helpful to remove half a pint of blood through a small incision initially and give this, after mixing with citrate solution, back to the patient direct by the syringe method by the arm veins before the operation is proceeded with The rate can be fairly fast initially, 10 c c per minute for several syringefuls This rather fast return of blood is permissible for the first 10 oz of blood only, as the patient's blood volume is much depleted After the first half pint has been given, a transfusion should be proceeded with at the slower rate By this means a patient's general condition is greatly improved It is worth waiting for fifteen to twenty minutes before proceeding with the operation

Raper [127] reported a case of generalised " splenosis " within the peritoneal cavity as a result of a ruptured spleen having occurred some years earlier The cells released from the damaged spleen pulp, at the time of the accident, had presumably become engrafted on to the peritoneal surfaces at various sites In view of the ease with which spleen cells may become implanted and start to grow, the possibility suggests itself that in cases where an autotransfusion is given these patients might possibly at a later stage develop metastatic spleen tissue, as a result of spleen cells being admitted to the circulation during the transfusion No case has been encountered where this misadventure has been noted, but it is of interest as a possible late complication of autotransfusion in ruptured spleen cases

On attempting to remove a spleen, with limited experience, the anatomical relationships may be somewhat obscured by the presence of extensive blood clot and free blood through the peritoneal cavity With more practice this difficulty may not be so apparent It is advisable in removing a spleen to make a systematic approach, opening the lesser sac of the peritoneum along the greater curvature of the stomach initially If an attempt is made to remove a spleen by approaching it directly at the site of attachment of the pedicle to the hilum without opening the lesser sac of the peritoneum, it will be found that there appears to

which show a much higher incidence than this, in some reports the figure is given as over 75 per cent Such a high figure must be regarded with some reserve in view of the great discrepancy with other authorities There is, however, no doubt that primary carcinoma of the liver is relatively very common in male African subjects by comparison with other races

In investigating cases of this nature, every effort must be made to determine whether the case is one of a primary or secondary nature Those workers undertaking pathology exclusively are of the opinion that there is a close association between primary carcinoma of the liver and cirrhosis The association between schistosomiasis of the urinary bladder and carcinoma of that structure is well known With this in view there is a natural tendency to try to associate carcinoma of the liver with hepatic schistosomiasis In the Far East it is considered that a very high proportion of the cases of primary malignant disease of the liver are closely associated with *Schistosoma japonica*, affecting the liver

Why male patients should be so much more frequently affected with primary carcinoma of the liver than female patients is not easy to understand Considering a large number of cases of this condition over several years, it has been observed that in practically all cases of primary carcinoma of the liver the patients were in the habit of chewing kola nuts freely In Mohammedan communities in West Africa tobacco-smoking is not indulged in very freely, but chewing of kola nuts is a common habit amongst the male members of the community The females of Mohammedan communities use kola nuts much less frequently In areas where kola nuts are not used, the incidence of primary carcinoma of the liver appears to be much lower Not being familiar with the habits of dwellers in other parts of Africa, other than the West Coast, no conclusions can be drawn on this matter in regard to them Primary malignant disease is more common in the up-country people of the west coast of Africa than in residents of the coast towns

Primary malignant disease of the liver produces vague discomfort about the epigastrium and the liver initially, and this is accompanied by loss of weight and general vague feeling of indisposition There may be marked depression When the condition becomes advanced, signs come on indicating obstruction to the hepatic veins as the blood leaves the liver, pressure on the hepatic veins gives rise to the rather abrupt onset of ascites known as the Budd-Chiari syndrome Jaundice may also occur, and it indicates implication of the bile duct system by local pressure of the growth Patients almost always have a slight irregular temperature with this condition, varying between 100° F and normal There is no fixed pattern associated with the temperature other than low grade and irregular

A chronic inflammatory condition may be suspected at the early stages because of the slight fever, such as an amœbic hepatitis which may on occasions be of the low-grade type With Europeans subacute amœbic hepatitis is often accompanied by a hectic fever and the patient is very ill indeed, but in African patients the condition may be of a much lower grade and more chronic A white blood count may be helpful in these cases In active inflammatory liver conditions the white count may be at least double, going up to about 14,000 per cm A white-cell count of less than double the normal cannot be taken as a definite indication of a

A very high proportion of persons suffering from these symptoms are adult male patients Primary carcinoma of the liver is much more common in male patients than in female patients Fig 57 shows a female patient suffering from this condition The frequency with which the condition is seen in male patients, over 90 per cent, applies not only to Africans but to patients in India and China Chung [125] found in his large series of 107 cases that men were seen to be affected by the condition fourteen times more commonly than women Liu [129] noted the incidence of primary carcinoma of the liver relative to total carcinomata found at post mortem, and compared his own series of cases from Peking in China with series reported from Europe, North America, the Far East and Africa The



FIG 57
Case of primary carcinoma of the liver

figures suggest that primary carcinoma of the liver is relatively much the most common in African subjects The figure given in his paper to represent African subjects was taken from a South African Bantu series The comparative figures are

African	37 4 per cent
Oriental	14 9 per cent
Chinese (Peking)	11 4 per cent
American (U S A)	2 1 per cent
European	1 1 per cent

Edington,[9] working in the Gold Coast, found 7 6 per cent of total carcinomata to be due to primary carcinoma of the liver The figures for Nigeria and Uganda were 8 1 and 7 6 per cent respectively, while the figure for French West Africa was much higher—25 7 per cent Other series have been published in Africa

not always be possible to remove tissue from the neoplastic area If the result is positive the finding is valuable, but *if it is negative the result should be regarded* with reserve

As patients come to hospital in the hope of being cured, it may be possible for the cases to be given much temporary relief even though cure is not possible If a patient is found to have a primary carcinoma of the liver and is sent home without treatment, as being considered hopeless, he is condemned to great distress both mental and physical prior to decease, which may be in six months to one year In these cases it is considered worth undertaking a laparotomy On occasions it is found that the case is not of malignant origin as suspected The indisposition of the patient in cases of liver malignancy is ultimately caused by a combination of pressure symptoms due to an expanding mass within the confined space of the



FIG 58
Specimen of left lobe of liver removed by diathermy for carcinoma

peritoneal-covered liver The situation is aggravated by hepatic vein obstruction causing further congestive enlargement of the liver To some extent also the interference with the free drainage of bile from an affected segment of liver tissue produces toxic symptoms If the obstructive element could be relieved the patient would feel symptomatically very much improved

In view of the hopelessness of the condition in positive cases where it is impossible to remove the growth completely, the practice has been undertaken of partially dividing the liver from a position close to the hepatic veins posteriorly across the dome to the anterior margin of the liver for a depth of about 2 in, the anterior end of the section coming out close to the position of the porta hepatis or entry to the main blood vessels and exit of the bile ducts By partially dividing the liver in this position, the minimum number of vessels and ducts are sectioned The bleeding is not unduly severe if the operation is undertaken with a diathermy knife The bleeding can be controlled in most cases by a pack applied for ten to fifteen minutes It is an advantage if the patient can have a blood transfusion to make up for blood lost In rare cases a left lobectomy can be undertaken with

well localised inflammatory process, though it may be suggestive of it If chronic amœbic dysentery is detected, it should be treated Any form of schistosomiasis, if found, may require treatment It must be remembered that either of these conditions may exist in addition to a primary carcinoma of the liver

Bolan's blood test for malignancy may be undertaken with advantage The method is easy and a positive result can be taken as at least suggestive of carcinoma in some situations Facilities may or may not be available for undertaking a direct Van den Bergh blood bilirubin estimation test, which, if positive, suggests biliary obstruction being present Mallen's iodine flocculation test for liver function, as already described, may also be helpful, though it indicates only the presence of an altered serum protein which is found with any form of liver dysfunction, without necessarily giving any further indication of the nature of the liver damage

Beard's antrone test for excess urinary gonadotropin has been found useful by workers in India and the Far East in testing for malignancy Navarro and Navarro [130] have used the test and consider it reliable This test has not been employed personally It depends on the fact that there are two kinds of gonadotropin—one a pituitary type which is not digested by chymotrypsin, and the other which occurs in pregnancy and malignancy both of these latter are digested by chymotrypsin It is necessary initially to estimate the total gonadotropin in urine and then, using another specimen of urine of the same volume, undertake a further estimate of gonadotropin after digestion with chymotrypsin The amount of gonadotropin removed by the digestion with chymotrypsin represents the malignant gonadotropin in a male or non-pregnant female patient The result of the test is read off in units as indicated by an electrophotometer The unit readings vary between 0 and over 300 The results indicated are

0 to 30 units	Negative	Within normal healthy limits
30 to 90 units	Plus 1	Suggestive of malignancy
90 to 180 units	Plus 2	Malignancy very probable
180 to 270 units	Plus 3	Advanced case of malignancy
Above 270 units	Plus 4	Very strong positive in late cases

Any of the biological tests for gonadotropin may be used to detect malignancy and may be useful in male patients and non-pregnant female patients

In cases of enlarged liver it is necessary to exclude conditions of non-malignant portal hypertension This matter has already been referred to under Portal Obstruction, Hypertension and Ascites The presence of enlarged œsophageal varices is the most characteristic sign of the condition

If in cases suspected of malignancy there is ascites present, fluid may be aspirated from the peritoneal cavity for examination Blood-stained ascitic fluid is strongly suggestive of malignancy having reached the surface of the liver Ascites usually indicates that there is pressure being exerted on the hepatic veins impeding the outflow of blood from the liver to the vena cava

A further surgical procedure which may be used in the detection of primary carcinoma of the liver is needle biopsy and specimen microscopy A Silverman biopsy needle is most suitable for this purpose Only a limited number of cases where malignant disease is present will give a positive result, as it may

relieve them of perpetual severe pain This operation is not difficult and a patient may be greatly relieved by it The leucotomy is undertaken on both sides at the same time The patient's mentality is greatly altered by this procedure In cases where strong sedatives were required to relieve the patient both mentally and physically, following bilateral leucotomy, they eat and sleep well and retain a happy and care-free outlook Following a bilateral leucotomy a patient usually is somewhat incontinent of urine for two to three weeks Additional nursing is therefore necessary, but bladder control is regained within three weeks This procedure has been undertaken on a limited number of occasions with satisfactory results Fig 59 shows a patient for whom this operation of prefrontal leucotomy was undertaken

ABNORMALITIES OF THE PANCREAS

The pancreas is an extremely important organ of the body It regulates, by its secretions, some of the most important processes of metabolism affecting carbohydrates, proteins and fats In spite of the importance and constant activity of this organ it causes relatively very little trouble Diabetes is seen in the tropics but it is less common than in non tropical areas Very few of the cases encountered have been of a severe nature Patients admitted to surgical wards may be found to be suffering from glycosuria, but in a fair proportion of these cases no diacetic acid is noted in the urine Some of these cases are probably not true diabetics The conditions may be more in the nature of a failure of the liver to mobilise the glucogen substances A limited number of patients with glycosuria are true diabetics Some patients admitted to surgical wards with septic conditions are found to have sugar in the urine, but in some of these cases the glycosuria disappears as soon as the septic condition clears up Patients with glycosuria in Africa often have the condition brought to their notice by the fact that they observe that when their urine is left in a receptacle at night an enormous number of ants gather about the urine, unlike that noted with the urine of other persons Where this occurs, the urine is invariably found to contain sugar Ants are much attracted by any form of sugar-containing substances

Patients requiring surgical procedures, who are found to have diacetic acid in the urine, should have this cleared by appropriate treatment before non urgent operative measures are undertaken A trace of sugar in urine need not necessarily preclude operation, but chloroform should be avoided in anæsthesia Diabetic patients should be given some instruction following operation regarding regulation [illegible]

such as Rastinon Recently extracts of *Lagerstromia speciosa*, a very pretty [illegible] tree in the tropics, popularly termed "Queen of Flowers," has been found to have a marked hypoglycæmia producing action Two preparations are made from this source called Bababins and Plantyms These are American products which have not been used personally

The pancreas does not become characteristically affected by any of the typical tropical diseases, as far as is known As with any form of blood borne infection

removal of the growth but a neoplasm is seldom diagnosed until the condition has become widespread Fig 58 shows a specimen of the left lobe of the liver removed by diathermy It contained multiple neoplastic masses The patient was very much improved following this operation and lived for a further eight months in comparative comfort and without the ascites recurring The pressure on the hepatic veins had been largely relieved by the procedure The patient ultimately returned to hospital seven months after the initial operation and died very soon in a toxic state rather than with great pain

If in addition to dividing the liver substance to a 2 in depth the entering portal blood is deviated by a porta systemic shunt of the splenorenal type with splenectomy, a further advantage is gained This is the easiest form of shunt



Fig 59
Prefrontal leucotomy patient with advanced inoperable carcinoma in pelvis

operation to perform Following the removal of the left lobe of the liver in this case the bleeding was not unduly severe and stopped almost completely after [illegible]

surface In view of the marked advantage gained symptomatically by partial splitting of the liver to allow space for expansion of the growing neoplastic mass and so relief of hepatic vein pressure, the procedure would appear justifiable A very important part of a doctor's work is to relieve pain even though permanent cure may not be possible

The possibility of undertaking a prefrontal leucotomy as an alternative method of relief in these cases can be considered after consultation with the relatives It is necessary to give a limited explanation also to the patient, though full details may not be necessary Most patients will agree to any operation which will

accurately In cases where surgical treatment by open operation was undertaken the mortality rate was as high as 50 to 80 per cent, but with conservative methods the results were much better, the loss being only 10 to 20 per cent In view of the considerable experience of Lan Shi-Chun and his colleagues the method of treatment advised is noteworthy It consisted of

1 Relief of pain by sedatives
2 Paravertebral nerve block of the sympathetic nerve chain at the first lumbar and twelfth dorsal areas
3 Gastric deflation by nasogastric tube
4 Intravenous fluids
5 Antibiotics, penicillin 1,000,000 units daily to prevent complications
6 Intravenous calcium to adjust the low blood calcium associated with this condition

Surgery was undertaken only where relief of duct obstruction was considered necessary In undertaking the paravertebral nerve block 10 cc of 1 to 2 per cent procaine is injected about the sides of the bodies of the twelfth dorsal vertebra and the first lumbar segment The needle is inserted high in the lumbocostal angle The action of the novocaine appears to be even more beneficial in the relief of the pancreatic pain than is morphia A low blood level of calcium salts is noted in pancreatitis, and this can be rectified with advantage by giving intravenous calcium salts

Chronic pancreatitis is difficult to diagnose and ultimately considered as a diagnosis in cases where all examinations are found to be negative and yet the pain persists About one case per year was encountered personally In all cases recognised the patient has been a young male adult The pain, a little above the umbilicus, has been of a gnawing chronic nature, varying in intensity but seldom completely leaving the patient Several of the patients have had the appendix removed elsewhere before being seen, in the belief that the condition was one of chronic appendicitis The removal of the appendix made no difference to the condition The intensity of the pain varies greatly from time to time but with an attack of severe pain the temperature rises to about 99 8° F Ascariasis or duodenal ulcer may be suspected in these cases, but all examinations for these conditions may prove negative With the persistence of symptoms and the absence of positive findings, a laparotomy has been undertaken where laboratory facilities were not available in some stations The serum amylase level is worth estimating, though it is usually only slightly raised in chronic pancreatitis cases The patient's pain may be sufficient to precipitate vomiting on occasions It may also interfere with sleep In these patients it has been found at operation that there is a marked nodular thickening of the whole of the pancreas, head, body and tail If the head of the pancreas alone were hard and nodular, carcinoma might be suspected in the older age group of patients, but the fact that the whole pancreas is involved is a point in favour of an inflammatory rather than a neoplastic disease In some of these cases a cholecystoduodenostomy has been performed for relief of pressure in the bile and pancreatic duct system, some inflammatory condition of the area of the ampulla of Vater being presumed though not proved

it may on occasions become involved Armbrust,[131] working in Brazil, found schistosome ova in the pancreas on section In one case where carcinoma of the head of the pancreas was suspected the patient was given a course of antimony because of schistosomiasis detected elsewhere in the body and it was found that the enlargement of the head of the pancreas disappeared It was concluded that the pancreatic abnormality was likely to have been due to schistosomiasis, though this was not proved No other cases of schistosomiasis of the pancreas have been noted in the literature The organ is probably seldom examined with this in view

Malignant disease of the head of the pancreas has been seen in a patient in the tropics, but the case was not operated upon This African patient, who had been known personally for some years, had been previously in hospital and operated upon for senile prostatic hypertrophy with urinary obstruction The patient, when first examined for the pancreatic condition, was found to have metastatic malignant growths involving the skin of the umbilicus and other parts of the anterior abdominal wall On removing one of these nodules for biopsy, malignant pancreatic tissue was detected No further operation was undertaken and the patient died three months later

Pancreatitis of the acute, subacute and chronic forms are all seen occasionally, the chronic form being much the most common in West Africa One patient with acute tonsillitis had urine tested at the beginning of his illness and was found to have neither albumin nor sugar present One week later there was an abrupt onset of polyuria and thirst On testing the urine a large quantity of sugar was detected It was presumed that the condition was due to an acute interstitial pancreatitis secondary to the infective throat condition The glycosuria cleared up on dietetic regulation alone, but the patient for many years subsequently continued to have a slight trace of sugar in the urine at irregular intervals Acute parenchymatous pancreatitis being rare is seldom diagnosed in the tropics When on rare occasions the condition does occur perforation of a duodenal ulcer is usually suspected There is severe abdominal pain and muscle guarding present in both conditions

It is extremely important to differentiate accurately and quickly between acute pancreatitis and perforated duodenal ulcer, as the former condition is better treated conservatively without open operation, while the latter is better operated upon in all but exceptional cases The two conditions can be quickly differentiated by undertaking two tests The first test is an X-ray examination of the abdomen, with the patient in the sitting upright position, to see if air has entered the peritoneal cavity, as with intestinal perforation, and is visible under the diaphragm If a subphrenic pneumoperitoneum is noted (Fig 69), a perforation of some sort can be diagnosed with certainty A serum amylase test should also be undertaken if laboratory facilities are available Normal serum amylase as tested by the Somogyi [133] method is usually very constant at about 200 units In acute pancreatitis this level is raised to between 400 and 1,000 units Lan Shi-Chun [132] found that in Shanghai pancreatitis constituted 1 6 per cent of all acute abdominal emergency admission cases The serum amylase test was used and found to be the most valuable single factor in establishing the diagnosis

in patients who die as a result of the condition locally known as "Bangungut, which, being interpreted, means "death during sleep" Cruz [29] reports that this condition is well known in that area of the world In Filipino labourers working in the Hawaiian Islands the condition is also seen not infrequently but not in the local inhabitants of Hawaii Men alone were affected in his series of cases and not women The condition occurs at night but not during sleep in the day-time There is usually a history of an apparently healthy patient going to bed following a large meal The patient is noted to suffer from a struggling attack during sleep and is presumed to be having a nightmare and is apparently in great distress Most people who have a nightmare wake up with fast pulse and respiration and in a frightened condition Nightmares are more common after a heavy meal taken late in the evening In these cases seen in the



FIG 60



FIG 61

Fig 60 —Patient with large pancreatic cyst seen before operation
Fig 61 —Large pancreatic cyst seen at operation while being removed

Philippine Islands the patient does not wake up but is noted to collapse and die In such cases at post-mortem examination the findings are

1 A dilated right ventricle of the heart
2 Petechial hæmorrhages in the pancreas

Guzman [134] gives a comparable report of the condition to that of Cruz The suggestion has been made that obstruction of the ampulla of Vater by an ascaris worm may be a precipitating factor in the production of this condition, but if this were the case one would expect the condition to be seen over a widespread area and in both male and female patients, yet this is not the case The only condition noted in Europe which bears some similarity to this condition in the Philippine Islands is the occasional thymic death occurring during anæsthesia, usually in young male children Wilson,[135] discussing thymic death, made the unusual observation that in a fair proportion of cases where this type of fatality occurs the patient is noted to have lymphoid tumour tissue in unusual sites in the body In two cases lymphoid tumour tissue was found in the jaw bone

A gastro-enterostomy was necessary in addition in one case because of pyloric obstruction

Some of these operations were undertaken before the time when penicillin became freely available In view of the very beneficial effect of penicillin given in large doses in these cases, it would appear that treatment by antibiotic drugs should certainly be undertaken in subacute and chronic cases as well as in acute cases before open operation is considered Any obstructive condition about the exit of the biliary tract to the duodenum may precipitate inflammatory changes in the pancreas Biliary ascariasis may well induce an attack of pancreatitis The high incidence of biliary ascariasis noted in China may account for the high incidence of acute pancreatitis which appears to be more common in the Far East than in Africa Once infection in the pancreas is established it may become chronic and recurrent Biliary obstruction at the lower end of the bile duct due to gall-stones is seldom seen in African patients The incidence of gall stones varies in different parts of the tropics in most areas it is less common than in temperate climates

Cysts of the pancreas are seen occasionally In cases seen personally there has been a very large unilocular cyst presenting in the middle of the abdominal cavity The stomach is pushed upwards and forwards This displacement, as indicated by barium X-ray examination of the stomach, is the most pathognomonic feature of the condition Figs 60 and 61 show an exceptionally large pancreatic cyst before and at operation. In spite of the enormous size of the cyst present it was not unduly difficult to remove The patient made an uneventful recovery

Various operations have been designed for dealing with pancreatic cysts if they cannot be removed completely Drainage of a cyst by the formation of a Y-loop of ileum with anastomosis of the free arm to the cyst has been suggested In none of the cysts personally encountered could this procedure have been undertaken with safety, all being thin-walled and unsuitable for any form of anastomosis Marsupialisation of the cyst has also been recommended The fluid contained in the cyst is said to be of a non-irritant type In none of the cases seen was it unduly difficult to remove the cyst completely, though it necessitated slow and careful dissection Great care must be taken when working at the position of attachment of the cyst to the pancreas to avoid damage to either the cyst or the pancreas, where the two are adherent No drainage has been employed in any of the cases dealt with, after removal of the cyst, and no complications were noted following operation in any case A pancreatic cyst is usually rather fixed in position and in this respect it differs from an ovarian cyst, for which it may be mistaken. There also is no indication of its attachment to pelvic structures on lower abdominal examination Where a large cyst is present a fluid thrill can usually be felt.

Trauma of the pancreas following accidents is a rare occurrence Injury of the pancreas may occur following splenectomy if the spleen pedicle is not approached correctly through the lesser sac of peritoneum The tip of the pancreas may be injured where a splenectomy is attempted by approaching the hilum of the spleen direct without opening the lesser sac of peritoneum

Reference has already been made to the peculiar condition noted in the Philippine Islands where pancreatic changes are found at post-mortem examination

matter *Tricho-phytobezoars are those* where there is a combination of hair and vegetable material and the concretion variety are those where the mass is formed by other materials Bezoar formation in animals may be due to licking the hair surfaces of the body when cleaning themselves, as seen in cats A considerable quantity of hair is ingested over many years In animals a "hair ball" in the stomach is well known Hair in the stomach in human subjects is rare, though cases have been reported The difficulty with which hair is removed from the outlet of a sink by running water is well known Hair is not easily washed away by water, and once it becomes lodged in the stomach, food of all sorts may pass along the stomach over the surface of the mass without dislodging the bezoar formed

The skins of certain types of fruit are well known to be the cause of bezoar formation Persimmon fruit, grown in subtropical climates in the latitudes 30° to 40° and seen frequently in the Mediterranean area and parts of Asia, is of this nature Fig 62 shows a picture of this fruit taken to illustrate its appearance to those who are not familiar with it It looks rather like a yellow tomato but with central "stones," four to six, rather than "seeds" When persimmon fruit is eaten a peculiar character is noted about it, namely, that it has a rather astringent taste Its juice removes the smooth mucus-like material from the surface of the insides of the cheeks and gums in such a way that the tongue does not slide over the surface of the inside of the cheek when moved about in the mouth This feature is probably one of the important determining factors in bezoar formation by persimmons The same can be noted in certain other fruits and berries, many of them well known to children This mucus-removing property is particularly noticeable on eating sloes, the fruit of a small wild plum, *Prunus spinosa*, which is a blue-black wild berry found in unkempt hedgerows in the United Kingdom They are much less common nowadays than formerly, with the greater care of country hedgerows The astringent nature of rather unripe fruit may be one of the peculiarities which determines phytobezoar formation

Of the few bezoars noted in surgical practice in the tropics, most have been due to the ingestion of orange pulp Children tend to eat the pulp of the orange frequently after they have sucked as much as they can out of the fruit There has been seen in these bezoars, as well as orange pulp, rice and palm oil, all firmly adherent in a solid mass The patient may continue in fair health for many years in spite of the palpable mass present The food passes along the gastric canal beneath the lesser curvature of the stomach The essentials of bezoar formation are the insolubility of the material of the mass, the adhesive character of the mass formed The growing mass ultimately exceeds that which can be passed through the pyloric canal

The symptoms produced by a gastric bezoar are usually a sense of heaviness in the epigastrium and loss of appetite, vomiting may occasionally occur The patient often notices the mass growing slowly over some years The condition may be brought to notice by the onset of gastric complications as a result of ulceration, hæmorrhage or perforation of the stomach Pyloric obstruction may also occur On examination the mass can be felt quite easily The characteristic "pitting on pressure" differentiates it fairly easily from a true neoplastic condition This sign is very important X-ray examination of the stomach is also important

The case of an African girl suffering from an attack very like that noted in "Bangungut" in the Philippine Islands has been mentioned An accurate report of the case was given by a relative who was a trained nurse The patient in an unconscious condition was given the enema and a copious result was obtained Following this the patient's condition improved

BEZOAR FORMATIONS

The word "bezoar" is a peculiar term of French origin The name is derived from a Persian word *pâdzhar*, meaning an antidote Originally any stone formation was associated with the term bezoar in the belief that the concrete-like mass formed in any part of the body was an indication of the body's development of resistance against disease There may be a modicum of truth in this mythical idea, as seen by the alleged finding of typhoid bacilli in gall-stones and schistosome ova in the centre of urinary calculi The term bezoar is now, however, used in a different sense, being considerably removed from the idea of stone formation

A bezoar is a formation of insoluble adherent material of animal, mineral or vegetable matter within the intestinal tract of man or animals The mass accumulates slowly and remains lodged within any portion of the intestinal tract Ruminant animals have probably got a much greater ability to deal with insoluble vegetable matter ingested with food than has man It has been [illegible] that the
ve
of
considered as the possible original use of the appendix The vermiform appendix is relatively very much larger in some animals than in man Man appears to have a very limited, if any, ability to digest insoluble cellulose materials

Most bezoars are found in the stomach, a smaller number are found in the lower end of the ileum or in the large gut These positions represent the areas of the intestinal tract which precede a sphincter mechanism Beyond the stomach the pylorus, beyond the lower ileum the ileocæcal valve and at the lower segment of the sigmoid colon the pelvirectal "sphincter" is more physiological in nature than anatomical Considering a bezoar as an insoluble mass of adherent material which cannot be passed on because of the bulk and adherent nature of its contents, it is noted that there are several types of bezoars Those due to hair, termed trichobezoar, and those due to vegetable matter, phytobezoar, are usually distinguished It is not usual to include minerals as a material making up the bulk of a bezoar, but where a patient, usually mentally deranged, repeatedly swallows numerous metal objects such as coins, nuts and bolts or wire, an insoluble mass of metallic material accumulates in the stomach which cannot be passed on This is essentially a metallic bezoar

Epstein [138] classified bezoars as trichobezoar, phytobezoar, tricho-phytobezoar and concretion types, the latter being made up of shellac varnish which was swallowed by painters while smoothing their brushes, and in some instances paraffin wax A case is described of a phytobezoar due to a mass of impacted tomato skins Trichobezoars represent those due to the swallowing of hair, the phytobezoars being those where the insoluble material ingested was vegetable

was ultimately operated upon on failing to remove the mass by repeated enemata and aperients The mass was obviously of fæcal origin, it could be pitted on pressure At operation it was not found possible to break up the mass on manipulation of the bowel direct at operation The patient's general condition was not very good, and so it was thought unsafe to undertake a left hemicolectomy The splenic area of the colon is often quite difficult to remove An anastomosis was therefore undertaken between the transverse colon and the sigmoid flexure of the bowel The patient had an easy convalescence from the operation and following this procedure her bowels acted regularly She still, however, had the large mass present so that although she might be classed as improved following operation, the surgical procedure cannot be classed as entirely satisfactory A hemicolectomy might have been better if the patient had been fit enough to stand it, but this was considered unsafe. This case is mentioned to illustrate the rather unsatisfactory nature of a by-pass operation in these cases It may have been the best that could be undertaken considering the circumstances, but the procedure *leaves room for reflection in consideration of further cases of this nature which might be encountered* Young[139] *reports the interesting "Haw-Haw" syndrome* from East Africa This is a form of rectal phytobezoar caused by eating the berries of the "Haw-Haw" shrub (botanically—*Grewia tenax*) The mass of impacted seeds has to be removed from the rectum with an instrument

MEGACOLON IN CHILDREN

Severe constipation from birth is a well-recognised condition in all parts of the world Male and female children are about equally affected by this condition Some cases of severe constipation in infants are secondary to improper feeding habits in bottle-fed babies, but these cases can usually be rectified by altering the [illegible] more free bowel action [illegible]

persistent constipation continues, with abdominal distension, Hirschsprung's disease or megacolon may be suspected In examining constipated infants it is necessary to exclude the possibility of a congenital stricture of the rectum being present In [illegible]

examined digitally, using a well-oiled [illegible] finger [illegible] lubricated, can be inserted into the rectum of a normal infant without causing injury or undue discomfort Most children seen with megacolon have been admitted to hospital between the ages of 3 and 6 years Whereas repeated enemata may relieve the constipation associated with Hirschsprung's disease, the basic factor remains unaltered and there is little tendency for the bowels to act in a normal physiological manner Children with this condition seldom complain of severe abdominal pain, although the bowel sounds are usually much higher than normal, suggestive of an obstructive lesion The outline of a very distended colon can often be observed on examining the abdomen The colonic mass pits on

If on occasions metallic material is present it can be detected easily by radiography The long history of local swelling which often amounts to some years may suggest the nature of the mass as opposed to malignancy The fact that the patient's condition appears reasonably good in spite of the large epigastric mass present is against a diagnosis of late malignancy

In the case of patients with bezoar formation in the large intestine there is usually a history of chronic constipation which dates back to the patient's childhood In this respect there may be some link between bezoar formation and Hirschsprung's disease or congenital megacolon, the probable basis of the condition in this site being an abnormal neuromuscular relationship The



FIG 62
Persimmon fruit which is associated with bezoar formation

number of bezoars seen by any individual surgeon is not large, and it is therefore difficult to assess the value of different forms of treatment which may be suggested The consensus of opinion is that it is not possible to break up a bezoar by any form of solvent If symptoms are being produced it is therefore better to remove a bezoar surgically De Bakey and Ochsner,[137] writing on this subject, consider that the ultimate mortality rate of bezoars if treated conservatively is 60 per cent, whereas the operative mortality following surgery is as low as 6 per cent It is therefore better to remove a bezoar surgically if symptoms are being produced

On removing a bezoar from the stomach of a patient in West Africa the mass of orange pulp and rice required a fairly large incision in the long axis of the stomach to get it out The mass removed looked like a cast of the complete stomach The wall of the stomach was much thickened It is necessary to be particularly careful in repairing the gastric wound so that subsequent leakage does not occur Another patient with bezoar formation, an elderly African female, had an enormous mass in the descending colon for over two years The mass went up into the splenic flexure area The cæcum and ascending colon and transverse were not filled with fæcal matter The case could not well be classed as constipation The patient

Koberle,[140] working in South America, has made an interesting observation regarding cases of megacolon He has found in this condition about 95 per cent of the cases give a positive complement fixation test for Chagas' disease—that is, South American trypanosomiasis This is a much higher figure than that which might be expected in a random sample of the population in a country where the condition exists These cases of megacolon showed, on section of the defective gut, an indication of broken-down pseudo-cysts of Chagas' disease in the wall of the gut in this position but not elsewhere in the bowel These findings did not occur in patients with no megacolon Megacolon is a condition which is known all over the world, but Chagas' disease is limited to South and Central America His observations, however, suggest that possibly some infective parasitic agent, *e g*, toxoplasmosis, might be causative in early life in damaging the ganglionic mechanism Whatever the cause, it is generally agreed that the ganglionic mechanism is defective over a limited part of the large bowel just distal to the distended area The most effective means of dealing with this form of physiological obstruction is to remove the virtually denervated area by a surgical resection

Any form of gut resection in a tiny child is a serious undertaking and, as in most instances, the marked distension does not often come on until the child is 1 or 2 years old, it is probably wise to adopt conservative measures during the first three or four years of life If children with this condition pass the age of 10 or 12 years the constipation may in many cases become slightly less severe, even in the absence of treatment These patients go through life chronically constipated but getting some relief by large doses of aperient medicines

A small number of operations have been undertaken personally for megacolon where a resection of the lower sigmoid and upper rectal area was performed It is not easy to apply clamps neatly to the upper rectum because of its anatomical position in the pelvis An operation of this sort is thus not without considerable risk should the clamps become displaced or maladjusted On removal of the junction area it is necessary to undertake an anastomosis to reconstitute the continuity of the large bowel An obvious difficulty arises in that, having removed the defective area, the two residual portions of the gut to be joined are of very different sizes It would be hazardous to attempt joining these two circles of unequal size as the risk of a leaking junction would be considerable if a direct end-to-end anastomosis was attempted within the pelvis This difficulty had been got over in the cases dealt with by mobilising the distended sigmoid colon somewhat and removing a triangular area on the antimesenteric side of the bowel in such a way (Fig 63, 1) that, having closed the gap made by removing the triangle of tissue, the size of the upper circle remaining was similar to that of the lower circle of rectum An accurate anastomosis of the two portions to be joined can thus be undertaken The method has worked well and no accidents have occurred using this procedure

In order to decrease this risk, Swensen [141] has standardised his technique of rectal resection with sphincter preservation in a comparatively simple and safe operation (Fig 63, 3) The great danger is not in the primary removal of a portion of the gut but in making a satisfactory anastomosis subsequently in a rather inaccessible position within the pelvis In Swenson's method it is necessary first

pressure, indicating that there is a large mass of fæces present in the colon Soap and water emulsion is generally used for the purpose of giving an enema, but much better result may be obtained in these cases if a pure olive-oil enema of about 10 oz is given with 10 minims of turpentine added—1 minim per ounce of oil used Olive oil may be rather expensive, and an equally good result may be achieved by using locally prepared vegetable oil such as ground-nut oil Any form of treatment which does not deal radically with the cause of the condition is of temporary benefit only If radical treatment of any sort is advocated it must be on a sound and rational basis It therefore becomes necessary to ascertain what is the real cause of the condition present Megacolon secondary to organic stricture of the rectum must be treated by local dilatation of the stricture

It is obvious on opening the abdomen of a child with megacolon of a neurogenic type that the distended large gut extends to approximately the level of the lower fixed part of the sigmoid colon only Distal to this area the gut, as it enters the position of the upper rectum, looks normal or rather smaller in calibre than usual There is no obvious evidence of thickening of the rectum Apart from the history given by the parents of the child and the physical examination of the child's abdomen, the next most effective method of arriving at an accurate diagnosis of the nature of the condition suspected is by barium meal A photograph of the child's lower abdomen is taken from the lateral aspect eighteen hours after ingestion of the barium emulsion This shows up the cone like end of the dilated bowel at the site of the upper rectum By this means the level to which the dilated portion of gut extends can be determined accurately

Since the time of Hirschsprung's original description of the condition, it has been repeatedly demonstrated on microscopic examination of the dilated bowel that normal ganglion cells are present in the dilated portion of the gut, while below the area of dilatation ganglion cells are defective or absent over a distance of about two inches Lumbar sympathectomy operations have been undertaken by some workers in the past in the belief that this would relieve muscular spasm of the upper rectum which was presumed to be present and giving rise to the hold up in the gut above this area, but the results were not satisfactory As with all new operations, those who institute them invariably advocate their use, claiming beneficial results In time the true position can be assessed more accurately Lumbar sympathectomy for megacolon is no longer considered to be an advantage.

Saegessen [138] assumed that in Hirschsprung's disease there was an abnormally high tension in the circular musculature of the upper rectum, somewhat comparable to the condition developing in infants with congenital hypertrophic pyloric stenosis As recently as 1954 he therefore advocated a "sigmoidorectomyotomie," claiming good results from this operation which was carried out in the manner of a Ramstedt's procedure on the pylorus of infants The linea coli was divided longitudinally for 2 in and the underlying circular fibres carefully sectioned The approach is of interest This procedure has not been attempted personally Surgical opinion is generally agreed that the condition is caused by defect or absence of ganglion cells just beyond the lowermost part of the dilated large bowel, in the area of the rectosigmoid junction Why there should be an absence of ganglion cells in a certain number of infants is not known

the sides of the rectum it is highly desirable to leave as much areolar tissue as possible when stripping the rectum inside the pelvis If the second and third sacral nerves are damaged in a male subject there is a subsequent interference with potency, and so care must be taken to keep as near the rectum as possible when freeing the surrounding tissues prior to invaginating the rectum into its own lumen and out through the sphincter In some cases of megacolon there is also some degree of involvement of the bladder with a chronically distended bladder present It is desirable, therefore, to catheterise both male and female patients before undertaking this operation for megacolon A course of sulphaguanidine should be given before the operation and streptomycin after it These measures decrease the risk of pelvic cellulitis This type of conservative rectal resection can be used also for early malignant rectal conditions and is very suitable in patients in the tropics who resent colostomies very much Following this operation for megacolon the patients' bowels act regularly and the patients are permanently improved

LOWER ABDOMINAL SWELLINGS IN FEMALE PATIENTS

The stage at which patients present themselves at hospital for treatment of any pathological condition is much influenced by their social, educational and economic position Those who are socially advanced, well educated and with a high wage-earning capacity tend to come to hospital early for treatment of any condition from which they may be suffering Those in a less favoured position seek treatment in many cases, at a very late stage, when disease is advanced The number of cases presented for treatment which show advanced pathology is much greater in tropical countries than in non tropical countries, the former areas on an average are less highly organised than the latter Many of the large towns in the tropics are now, however, becoming highly developed, while there are some parts of the non tropical world in a very backward state of development It is still quite usual to see female patients in the tropics coming for treatment of advanced pathology affecting the reproductive organs within the pelvis

Indigenous female patients in the tropics have a very different outlook on child bearing from women in northern climates This is probably due to a different hormone balance There is a much stronger desire to have children on the part of female patients in the tropics than amongst female patients in Europe Many female patients suffering from advanced pathology are seen where the basic object of treatment is not because of the inconvenience or the discomfort of an abdominal mass *per se* but because of the possibility of it interfering with child bearing The three major reasons for seeking treatment for pelvic complaints on the part of women in the tropics are, primarily, to have a child, secondly, because of the possible risk to life, and thirdly, because of physical discomfort produced by the abnormality The reverse order is usually the reason for seeking treatment by women in non tropical areas in a high proportion of the cases

It is essential in treating patients to consider their outlook on life It is a

to mobilise the whole rectum and the sigmoid colon and, if necessary, much of the descending colon Care must be exercised to leave an adequate blood supply to the sigmoid colon After adequate mobilisation the dilated colon is sectioned about 1 in above the constricted area between clamps Both ends are then closed completely This is not unduly difficult The clamps are then removed The closed rectum is now invaginated down into its own lumen and pulled out from below through the anal sphincter, like a sleeve being turned inside out The "reversed rectum" is then thoroughly cleaned and gripped, slight traction being

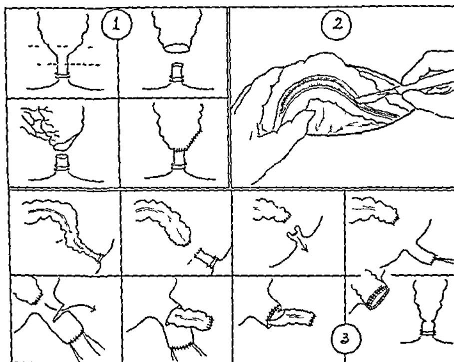


FIG 63
Diagrams illustrating operations for Hirschsprung's disease

applied The reversed rectum is then opened over the extent of half its lumen at a point 2 in from the anus The closed end of sigmoid colon is then brought down and threaded through the opening in the anterior part of the rectum The two tubes are now sutured in two layers The other side of the rectum is sectioned as the sutures are applied The sigmoid colon is then opened and the level adjusted so that the two tubes can have a further layer of sutures applied The junction, on completion, is allowed to return into the pelvis through the anal sphincter muscle After further glove-changing the peritoneum within the pelvis is adjusted and the abdomen closed

This operation gives good results in the surgical treatment of megacolon. Because of the proximity of the branches of the second and third sacral nerves to

affecting pelvic structures give rise directly or indirectly to probably not less than 50 per cent of all pelvic pathological conditions for which treatment is sought In view of the frequency of inflammatory conditions being present or a superadded element, it is advisable in non-urgent cases to give patients a course of a broad-spectrum antibiotic drug before any operation is undertaken Streptomycin and chloromycetin are the most suitable antibiotic drugs to give prior to pelvic operations The use of sulpha drugs may also be a great advantage Very few patients with palpably enlarged pelvic structures are not improved by a preliminary course of antibiotic treatment and use of sulpha drugs The diagnosis of pelvic swellings in female patients is usually not difficult if the basic principles of examination are adhered to which are taught to all students

The menstrual history is important in making a diagnosis regarding pelvic swellings in female patients If an ectopic pregnancy is sufficiently large to be felt on bimanual examination there is invariably a history of a missed period With late ectopic pregnancies, the pregnancy may have been present for any number of months up to full term In many cases of advanced ectopic pregnancy the fœtus dies These cases may be extremely difficult to differentiate from a large uterine fibroid Late ectopic pregnancy is seen much more commonly in tropical countries than in temperate climates It is not very uncommon to find a patient maintaining that she is pregnant for a time far exceeding the normal period of gestation She may give a history of having had six or even nine months of amenorrhœa and then start having normal periods again while there is a very large swelling within the abdomen, which she rigidly maintains is a pregnancy If this type of history is given it should not be lightly overlooked The presence of a large abdominal tumour and a history that the woman has missed some periods in the past is strongly suggestive of an ectopic pregnancy which has died In these cases much the best way of examining the patient is by radiography A lateral as well as an anterior view of the abdomen should be undertaken The lateral view is the more important for, as Feeney [6] has pointed out, the uterus at all stages of a normal pregnancy lies anterior to the bodies of all the lumbar vertebræ Therefore if a fœtus is within the uterus the fœtal bones as seen on a lateral X-ray photograph invariably lie anterior to the vertebral column If the shadow of the fœtal bones is noted to be posterior to the bodies of the lumbar vertebræ it can be safely concluded that the fœtus is in the ectopic position

One of the first cases of this sort seen was in a woman who maintained that she was pregnant for three years The history was disregarded as being incorrect She said that she had missed nine menstrual periods three years ago An operation was undertaken without an X-ray photograph being taken It was believed that there was a large fibroid of the uterus present On opening the abdomen carefully an adherent mass was encountered between the tumour present and the back of the anterior wall of the abdomen In endeavouring to enter the peritoneal cavity a large sac was entered and an infant's foot came out of the wound The patient was correct in her assertions It was quite extraordinary to note the very perfect preservation of the fœtus in spite of the long duration within the woman's abdomen The fœtus was full-term but not alive A photograph of this fœtus is shown in Fig 154

on the completeness of its removal and the rapidity of the patient's convalescence following the operation It is well to remember that an operation which to a doctor is part of the morning's work is to the patient an event of the greatest physical and psychological importance It is bound to influence the entire life of that person, any form of surgical operation becomes to a patient an epoch in her life With this in view much consideration should be given to the method of dealing with individual problems *If a female patient aged about 40 years complains of* feeling a mass in the lower abdomen and is found to have a small fibroid present in the fundus of the uterus, it is usually wiser, if she has no child, to leave the fibroid alone, for although her chances of having a child may be remote, to undertake a hysterectomy for a condition which in itself is not seriously damaging *her health jeopardises her mental outlook on life* With the loss of menstrual periods following a hysterectomy she may be greatly disturbed, feeling that the only chance of having a child, however remote, has been removed Severe depression may be produced without gaining any great advantage

One such patient referred to *hospital with a view to having a hysterectomy* for a uterine fibroid was advised to leave the fibroid alone until after the menopause She was aged 43 years and had no children One year later she produced her first child, to her great satisfaction, in spite of the fibroid being present The advice to leave the fibroid alone until after the menopause was greatly appreciated She is now no doubt a much happier woman than had an operation been undertaken following her consultation A hysterectomy is accepted much more willingly after the menopause in patients in the tropics than before that period of life There is very little tendency for a fibroid to become malignant, and the risk of leaving one alone for some years is not high The slightly larger size of the mass at operation, if surgical treatment has previously been deferred, does not mean that the operation will be necessarily more difficult or dangerous

Gynæcological operations undertaken in women who have a palpably abnormal pelvis are not followed by a high proportion of successful results in respect to child bearing Not more than possibly 20 per cent of cases on whom intra abdominal pelvic operations are undertaken with a view to improving fertility bear children subsequently If, however, the pelvis feels normal and yet the *patient has had no children the result of gynæcological operations to improve* fertility are much better The factor interfering with fertility in these latter cases is usually not of an unduly serious nature It is obviously necessary before undertaking any form of pelvic surgery in female patients with a view to improving the chances of child bearing *to ensure that the husband is not sterile This matter* will be discussed elsewhere

The various forms of enlargement of any of the reproductive organs in female patients can usually be subdivided into inflammatory conditions, cyst formations, benign tumour masses, congenital abnormalities, variants of ectopic pregnancy and malignant conditions Parasitic cysts due to hydatid disease or guinea-worm may also be found at times A full bladder secondary to a urethral stricture in a female patient in the tropics is usually due to lymphogranuloma inguinale At a late stage of this disease there may be scarring about the urethra and urine is passed through a minute pinhole-like orifice only Inflammatory conditions

noted on several occasions when observing the initial efforts of junior doctors *with limited experience*

No doubt this error may have been made by myself in the past until the *necessity of conserving peritoneum* was fully appreciated To point out this fact here may be helpful to those who are not already familiar with dealing with very *large fibroids* If a hysterectomy is being undertaken for fibroids every effort should be made to work close to the uterus and as far away as possible from the *lateral wall of the pelvis* *In this way the maximum amount of peritoneum will be conserved* For those with limited experience it is very helpful to tie off the *four individual structures which leave the upper and outer aspect of the uterus* as an initial step in undertaking a hysterectomy—the Fallopian tube, the round



FIG 64
Large fibroids of uterus as commonly seen in the tropics

…nd the main mass of veins which
before proceeding further The
be left so that the floor of the
pelvis can be covered with peritoneum without difficulty or tension If the the peritoneum is not joined over the floor of the pelvis at the termination of the operation and raw areas are left exposed, gross adhesions *will be formed between* the small intestine and the floor of the pelvis during the next two to four weeks Early intestinal obstruction may occur *Cases of early intestinal obstruction* have been referred for this reason on several occasions following hysterectomy *undertaken by those with limited experience* A *very serious* situation develops Once an excess of peritoneum has been removed it cannot be replaced

It has been found most suitable in these cases where extensive adhesions have already *developed between* the small intestine and the floor of the pelvis to undertake an extensive wedge resection of the small gut involved in order to remove

In these cases the fœtus alone should be removed The umbilical cord is tied off close to its attachment to the placenta and sectioned before removal of the infant The placenta is not removed as by now it is a small fibrotic mass firmly adherent to a non contractile bed Any effort to remove the placenta in these late cases is highly dangerous The abdomen should be closed without drainage after removal of the fœtus An extraordinary coincidence occurred in Accra, West Africa, in 1947, when five cases of full-term extra-uterine pregnancy were encountered within eight weeks, they were recorded by Bowesman and Chenard [14] There were two live births out of these five cases None of the mothers was lost

In the case of any large abdominal swelling in a female patient the diagnosis of which is not certain, an X-ray photograph in the anterior and lateral position should be undertaken Fœtal bones may be seen in any of the variants of pregnancy The question of normal pregnancy is not dealt with in this chapter The presence of teeth or bone may be noted in cases of dermoid cysts which are usually attached to an ovary or found, certainly most frequently, within the pelvis Calcification in cyst walls is also occasionally seen Lithopædian or calcified fœtus is very obvious A good example of a lithopædian is shown in a photograph included in Chapter 15

The size of a fibroid is not necessarily the factor which determines the ease or difficulty which may be expected in undertaking its removal The degree of adhesion to other structures is much more important The largest fibroid ever removed reached from the pelvis up to the diaphragm The patient's appearance initially suggested a triple pregnancy The removal of this enormous fibroid necessitated opening the patient's abdomen from the symphysis pubis to the xiphoid sternum Enormous blood-vessels had developed in the upper abdomen between the top of the fibroid and the liver These vessels had to be carefully ligated before the mass could be separated After dealing with these blood vessels it was not unduly difficult to undertake a total hysterectomy The patient made an uninterrupted recovery This patient had travelled for one year on foot from Rio de Oro to Gambia, where she was operated upon She anticipated doing the return journey in three months

Doctors working in the tropics for the first time who have not previously encountered such enormous fibroids are very liable to make a basic error in technique in attempting to remove such large pelvic tumours if it is not pointed out to them that in undertaking an operation of this type every effort must be made to conserve as much peritoneum as possible from the lower half of the tumour being removed A normal non pregnant uterus measures from 3 to 4 in in length and the amount of peritoneum necessary to cover this structure would be approximately the size of a circle of 3 to 4 in radius If it is remembered that the uterus on enlarging must draw peritoneum from its lateral surroundings as it mounts upwards it is quite obvious that the peritoneum ultimately covering the lower half of the enlarged uterus was originally on the lateral wall of the pelvis If a very large uterus (Fig 64) is removed with all the peritoneum covering it, there will be a great tendency as soon as the pressure is released for the remaining pelvic peritoneum to retract, almost like elastic, out on to the lateral walls of the pelvis, leaving nothing to cover the floor of the pelvis after the uterus is removed This mistake has been

fibroid of the uterus may occasionally be seen (Fig 65) prolapsed through th vagina, local excision is initially required followed by packing Hysterectom may be required later in some cases

A myomectomy for a large fibroid may be a dangerous operation and it i necessary to exercise great care in hæmostasis when undertaking a myomectomy If the uterus is not unduly large it may be very helpful to apply a Bonney myomectomy clamp to the neck of the uterus This instrument is designed to exert lateral pressure and so temporarily occlude the main uterine arterial blood supply while the myoma is being removed If the fibroids are very large the instrument may be difficult to apply accurately Myomectomy for large fibroids is seldom a satisfactory operation The risk of post operative hæmorrhage is high The chance of a pregnancy following removal of a large fibroid is poor

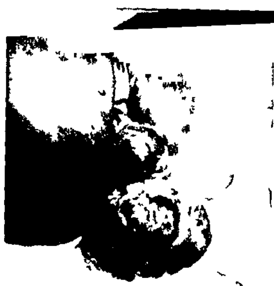


Fig 65
Prolapsed cervical fibroids

Enlargement of tubo-ovarian structures on one or both sides of the pelvis is very commonly seen giving rise to a completely adherent mass in the pelvis The condition is sometimes termed "frozen pelvis It is necessary to decide in these cases on opening the abdomen whether or not it is possible to remove the pathological mass present In many of these cases the uterus may not be enlarged at all The essential inflammation may be in one or both Fallopian tubes Abscess formation may have taken place about the ampulla of the tube and involving the ovary If the uterus itself is not enlarged it should not be removed If a hysterectomy is undertaken the woman will have no more menstrual periods and by this alone she will be much distressed As well as leaving the uterus an ovary should be left Even a portion of one ovary may be sufficient to supply the necessary hormone to ensure menstruation With care and patience it is surprising how a tubo-ovarian abscess mass may be removed completely without even rupturing the abscess cavity present in many cases If the essential pathological structure is removed much of the associated inflammation settles down completely in time

The greatest factor in precluding removal of a tubo-ovarian inflammatory or neoplastic mass is involvement of the main blood vessels of the pelvis Although in a large proportion of the cases a tubo-ovarian abscess can be removed complete with the associated tube and ovary, the a' scess cavity may in some instances rupture, it is advisable in these cases to have a suction apparatus available during

the multiple adhesions which had already formed between loops of the small bowel This is not usually unduly difficult. An end-to-end anastomosis is then undertaken to re-establish the continuity of the small intestine Following removal of this mass of severely damaged small intestine subsequent intestinal obstruction is much less likely to occur Some method must be instituted which will help to re-peritonealise the floor of the pelvis The method which has been found easiest is to use the loop of the sigmoid colon and turn it down on the floor of the pelvis The sigmoid colon becomes firmly adherent in this position, but this does not predispose to bowel obstruction in this area The left side surface of the loop has clean and undamaged peritoneum over it By this means the complete deperitonealised area on the floor of the pelvis can be peritonealised This method has been used on occasions with very satisfactory results It is essential in removing large fibroids to conserve as much peritoneum as possible

Great care must be exercised to avoid damage to the ureters A large fibroid may displace the lower end of the ureter This structure is much less likely to be injured if the peritoneal stripping is kept very close to the sides of the uterus Damage to a ureter is much more liable to occur on the left side than the right side The veins on the left side of the pelvis tend to be larger than the veins on the right side Whereas a large proportion of surgeons stand on the right of a patient when undertaking a hysterectomy or any operation within the pelvis, it may be found much easier to work from the patient's left side when undertaking a hysterectomy, the surgeon being right-handed This method is a routine practice in Manchester, England, although it is less commonly employed elsewhere When standing on the left-hand side of the patient, the right hand with which artery forceps are normally applied works in a much more direct forward line rather than with a "back hand" action, which has to be adopted when working from the right side

Although the standard incision for lower abdominal surgery tends to be the midline subumbilical variety, it is suggested that much better wounds will be obtained if the semilunar transverse incision is used (Fig 16) The incision should go through the natural fold of Langer's line The scar is better, and by cutting right across the rectus muscle on both sides an excellent exposure can be gained For all operations on pelvic masses which do not rise above the level of the umbilicus, the transverse incision is considered most suitable If a tumour rises above the level of the umbilicus it is better to use a midline incision which may be extended upwards if necessary In ligating large blood-vessels within the pelvis it is advisable to use fine but strong linen thread, this material is more suitable than catgut Thread grips blood-vessels much more firmly, remains in position much longer, and although it is not absorbable it does no harm The knot can be cut at 5 mm length without risk of it becoming undone

In undertaking operations on the pelvic structures of female patients where it is estimated that adhesions are present, it is desirable to give the patient a course of sulphaguanidine before the operation is undertaken This procedure ensures that if a gut resection becomes necessary in dealing with a difficult situation which may be found, adequate preparation will have been given The risk is decreased by undertaking this form of preliminary preparation A submucous

inflammatory mass is of a very chronic nature The surrounding structures become extremely hard, almost like cartilage, and the impression is initially gained that the condition must be malignant, whereas the condition is almost invariably not malignant Cases of this sort have not been seen in non-tropical areas An African female patient operated upon for such a condition in Oxford, England, was referred home to the tropics with a letter of reference The condition was thought to be malignant disease of the right ovary No malignancy was, however, detected on microscopic examination of tissue removed The prognosis was considered very poor Ten years later the patient was again seen in West Africa, her homeland, because of a large fibroid and chronic inflammatory changes involving the tube and ovary on the left side A subtotal hysterectomy and removal of the tubo-ovarian condition was undertaken in this case The operation



FIG 66



FIG 67

Fig 66 —Large ovarian cyst being tapped before removal
Fig 67 —Benign ovarian cyst The cyst was removed and the ovary conserved

was performed without difficulty and convalescence was easy It was of considerable interest having the opportunity of seeing the state of the right side of the pelvis where the earlier pathology had been removed It was found that all the chronic thickening had disappeared and the floor of the pelvis on the right side looked normal There is no doubt that the original condition found ten years earlier was an inflammatory condition and not malignant Cartilage-like hardness about the base of the ovary does not necessarily indicate malignancy This case was very instructive

Para-ovarian cysts are quite commonly found in female patients in the tropics These cysts represent a collection of fluid in the duct of Gartner, a thread like structure representing the vas deferens of the male which becomes vestigial in the female subject This thread-like tube contains an epithelial lining and probably as a result of inflammation within the pelvis the epithelium commences to secrete fluid Ultimately a very large accumulation of fluid collects within the layers of the broad ligament, on one or both sides of the pelvis The duct of Gartner runs between the upper third of the vagina and the position of the ovary on each

the operation if possible The pus in a tubo-ovarian abscess is almost invariably sterile, and it is not necessary to drain the pelvis following rupture of the abscess Care must be taken not to remove more than is absolutely essential in getting rid of the primary disease It is unwise to undertake a tube reimplantation on one side where a tube is judged to be reasonably healthy though obstructed at its inner third, in a case where a tubo-ovarian abscess is being dealt with on the other side A better result is obtained if these two operations are undertaken separately, although this may be an apparent hardship to the patient at the time

Ovarian cysts are comparatively common They may reach enormous proportions filling almost the entire abdomen on occasions The large ovarian cysts usually exhibit a fluid thrill If the cyst reaches to above the umbilicus, the resonant intestines above them assume rather a horse shoe like outline of distribution as indicated by the area of resonance on percussion above and to the sides of the large cyst present On opening the abdomen in the midline, or with a transverse incision if the cyst is not too large, it may not be possible to remove a large ovarian cyst through the wound, and the question arises as to whether the incision should be enlarged or the cyst should be punctured with a trocar and cannula to decrease its bulk and so permit of its extraction through the medium-sized incision Some authorities are of the opinion that an ovarian cyst should never be tapped because of the risk of spreading malignant cells in the peritoneal cavity This view is not held, and in order to remove a very large cyst through a subumbilical incision a preliminary puncture has been resorted to on many occasions without any apparent ill effects Fig 66 shows a large ovarian cyst being tapped If a large ovarian cyst is thin-walled throughout, with no evidence of thickening or local adhesions to other structures, it is most unlikely to be malignant If a cyst is thickened and adherent to local structures within the pelvis, puncturing is probably unwise

There may be a great temptation to remove an ovarian cyst complete with the ovary as may be judged by the appearance of Fig 67, the result is neat and the risk is small This practice was initially undertaken on arrival in the tropics, but after some years a more conservative line of treatment was adopted when possible It is surprising the ease with which a large ovarian cyst may be removed complete without being ruptured, leaving the ovary little damaged After the cyst is removed the ovary looks like a flat white piece of tissue containing ovarian follicles This flat mass can be oversutured and again approximate its original shape and size In making the incision through the ovarian tissue, in order to separate the cyst from the ovary, the point of the scalpel should be kept pointed towards the centre of the residual ovarian tissue and the point of the knife used only, the sharp edge of the blade of the scalpel being turned away from the ovarian cyst almost as though the back of the point of the knife is being used, subsequently blunt dissection is used with a Kocher's separator In this way the ovarian cyst is very unlikely to be injured The significance of the treatise on ovarian cystectomy by Bonney will not be fully appreciated until the method is used The technique of ovarian cystectomy is highly successful

For ovarian cysts not associated with gross inflammatory changes cystectomy only should be undertaken Cases may be seen in the tropics where a tubo-ovarian

very closely In view of the methods of treatment and prognosis this possible differential diagnosis must be given consideration From cases seen it would appear that *E histolytica infection of the cervix* is a much more painful condition than carcinoma, which is initially not painful, though it becomes so after involvement of the bladder and rectum at a late stage Both conditions have a mucohæmorrhagic discharge from the surface of the lesions If there is any evidence of punctate ulceration of the lateral walls of the vagina this is a point in favour of the condition being due to *E histolytica* If in remote areas no facilities exist for examination of biopsy specimens of the cervix, it may be permissible to give the patient a course of emetine to see if there is clinical improvement in the condition present within fourteen days, which might suggest that the condition is due to an *E histolytica* infection

Only a small number of cases of carcinoma of the cervix have been seen at a sufficiently early stage to be amenable to curative treatment by Wertheim hysterectomy In most instances the condition is seen at a late stage and with secondary growths in the pelvis Before undertaking a total hysterectomy for *carcinoma of the cervix it is advisable to undertake a cystoscopic* examination of the bladder to see if there is any obvious involvement of that structure If the back of the uterus becomes adherent to the surface of the rectum, complete removal of the disease by operation is very unlikely to be possible Cases have been seen where total hysterectomy is feasible where there is a very large mass of fungating tumour material attached loosely to the cervix It has been found very useful in these cases, before attempting a total hysterectomy, to curette the cervix completely with a sharp curette and, following removal of curetted material with a douche, to apply a 2 per cent formaline swab This is kept in position by a dry vaginal pack for forty-eight hours This method effectively removes a large amount of redundant tissue and makes the total hysterectomy much easier and safer Following this preliminary treatment the cervix looks as though it had only an erosion present of the non-malignant type This procedure makes the risk of spreading infection in the pelvis at operation much less The major operation can be undertaken ten days after the initial curetting The patient's general condition is improved as far as possible in the intervening ten days A *blood transfusion is a great advantage*

Carcinoma of the body of the uterus has been seen on very few occasions in African [illegible] of the cervix [illegible] present [illegible] abortion or any obvious abnormality of the cervix on visual examination, a carcinoma of the body of the uterus may be suspected In these cases a *dilatation* and curettage of the uterus should be undertaken The endometrium removed should be prepared and microscoped for malignant changes

A non-malignant carneous mole of the uterus is sometimes seen *following* an abortion and this gives rise to some uterine enlargement The placenta is *not* expelled with the fœtus during an abortion and it remains alive *Only two or* three of these cases have been seen in twenty years, they are *seldom encountered* Hydatidiform mole is a very much more serious condition This abnormality

side On opening the abdomen the cyst is noted to be thin-walled and with a dark bluish colour The cyst developing within the layers of the broad ligament is extraperitoneal in position This bag of fluid can usually be dissected out complete without being ruptured These cysts must not be gripped with forceps during removal as they are very liable to rupture

On opening the peritoneal tissue over the swelling the blades of a blunt pointed pair of scissors can be inserted and used as a spreader The cyst may be steadied by using a large swab in the hand and pressing on it gently The covering tissues must be carefully pushed away from the cyst Under no circumstances must the cyst itself be pulled It is usually possible to separate about seven-eighths of the cyst without great difficulty, but the lower eighth is often very firmly adherent to the surrounding structures at a level below that of the uterine cervix The cyst may rupture on reaching its base If seven eighths of the cyst is separated before the mass ruptures, it is usually not difficult to get out the last part If the cyst tears at an early stage in its attempted removal, it is extremely difficult to get out the complete lining membrane If the cyst is not removed completely, the fluid may again accumulate and a recurrence of the cyst take place Although this type of cyst may on occasions become very large, spreading right up into the iliac fossa, it does not ever seem to become malignant

On rare occasions a cyst may be found presenting in the upper third of the lateral vaginal wall This is in almost all cases accounted for as being a collection of fluid produced by the terminal portion of the duct of Gartner A cyst of this kind is not easy to remove, being very inaccessible either from above or from below If the cyst abuts on the vaginal wall, much the best thing to do after cleansing is to insert a short serum needle into the cyst and see if clear fluid can be aspirated If fluid is obtained it is obvious that a cyst is present The hollow needle is then removed and a short, thick, non-cutting needle is inserted into the cyst, the patient being under an anæsthetic and a diathermy current applied to the metal needle, thus burning a small channel into the cyst Through this means a permanent drainage opening is made into the cyst and fluid does not re accumulate The lining membrane of the cyst unites with the epithelial surface of the vagina and a permanent track is made into the cyst which no doubt, with the release of pressure, contracts down to very small proportions Small cysts about the ampulla of the Fallopian tubes are commonly seen They may represent residual elements of the epoophoron or be mucous cysts from the lining of the extreme outer part of the Fallopian tube

Malignant disease of the uterine cervix is equally common in the tropics and in temperate climates This is the most commonly seen malignant growth in female patients in the tropics There may be large secondary growths within the pelvis at the time the patient is first seen and examined Inflammatory thickening of the cervix of the uterus may also give rise to an appearance which is strongly suggestive of malignancy It is wise to confirm malignancy in suspected cases in this position before radical treatment is undertaken The possibility of a grossly enlarged cervix being due to infection with *Entamœba histolytica* should be remembered Surface secretion should be examined fresh in these cases for *E histolytica* The appearance of the two conditions may resemble each other



FIG 69

X-ray showing free gas under the diaphragm following intestinal perforation
(Photo by kind permission of Mr J K M Quarty, F R C S)

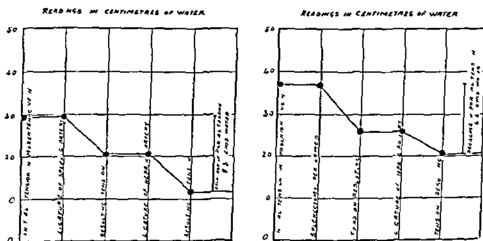


FIG 70

Graphs showing result of vascular operations in portal hypertension
(After Ruggieri)

is much more common in female patients in the tropics than in those in temperate climates If during the course of a pregnancy irregular uterine bleeding occurs and the patient is noted to have a uterus much larger than the size which might be expected from a pregnancy of the duration which the amenorrhœa would suggest, a chorion epithelioma may be suspected Apart from physical examination and X-ray examination of the lungs, a urine dilution test for gonadotropin as suggested by Tien Shueh-Ping *et al* [113] is most useful By this means an early diagnosis can be made This subject, which is of extreme importance in the tropics, is discussed under the section on Surgery in Pregnancy

Dermoid cysts associated with the ovary in female patients are not very uncommon Their nature is suggested by the presence of a swelling of long



FIG 68

Dermoid ovarian cyst showing teeth, hair and bone in fibrotic capsule

duration, as noted by the patient, which on examination is found to be rather fixed in position within the pelvis It is suggested that any cyst-like swelling arising from within the pelvis of a female patient should be examined by X-ray if the apparatus is available In the case of dermoid cysts the presence of opaque shadows may suggest the condition In these cases teeth and bone are not infrequently noted Fig 68 shows a dermoid cyst removed from a patient and opened, teeth, hair and a piece of bone are quite obvious Dermoid cysts of the ovary are usually not unduly difficult to remove It is necessary to exercise considerable care to avoid damage to the ureter, which may be very closely applied to the base of the mass

Hydatid cysts may occasionally occur within the pelvis in areas of the world where the condition is encountered Wray [111] has recently reported several abdominal hydatid cyst cases operated upon in Kenya, fifteen cases having been treated in three years The rate of animal infection with hydatid disease in Kenya exceeded 50 per cent in sheep in 1955 Hydatid disease within the pelvis may on occasions be secondary to hydatid disease in the upper abdomen A high positive

pain is complained of for up to two years following operation, a further laparotomy may have to be undertaken On opening the abdomen in these cases there may be no obvious cause found for the pain complained of, and the question arises as to what might be done to deal with the symptom of pain itself It has been found useful in this type of case following possibly the removal of a few minor adhesions to undertake a "*presacral neurectomy*" This term is possibly not a very good one, as it is not the removal of an individual nerve, as might be expected from the name applied to it it is a resection of the lace-like *conglomeration of autonomic nerve fibres which* are placed over the front of the fifth lumbar vertebra and are made up from the sympathetic ganglionic chain on both sides of the lumbar vertebræ Many names are associated with the individual small nerve bundles which form the presacral nerve plexus, but it is not any advantage to use these names in describing the way in which the plexus is made up

In order to undertake a presacral neurectomy all the autonomic nerve fibres which lie on the anterior aspect of the fifth lumbar vertebra and between the bifurcation of the great vessels need to be cut across The width of the section needs to be about 1½ in Great care must be taken not to damage the major blood-vessels On occasions abnormally placed veins may be present in the area Sometimes it is found that the multiple small nerves coming down from the lumbar ganglia unite into a fairly discrete mass *which can be easily detected It is not* infrequently called the presacral nerve, but in other cases there are multiple nerve fibres which do not join together but run down in a loose mass over the body of the fifth lumbar vertebra and subsequently spread out into two main masses towards the side wall of the pelvis Following this operation there is usually marked improvement in patients who had complained of post-operative pelvic pain It has also been employed in cases of persistent unexplained primary dysmenorrhœa

The operation can be used with advantage also in cases of severe dyspareunia and vaginismus In cases of advanced and inoperable malignant disease in the pelvis in women the operation also has a limited value No complications have been noted following this procedure, though cases have been reported where disturbance of micturition occurred following its employment This does not appear to be a serious hazard This procedure should be kept in mind in cases *where it is found at* operation that it is not possible to deal with the total pathology which may be found in the pelvis Where post-operative discomfort might be *expected for a prolonged time it might reasonably be undertaken at* the time of the *initial operation Pain may be a normal* and useful physiological protective mechanism but if, as a result of disease, it serves no useful purpose and a patient is obliged to suffer because of chronic pain, the interruption of the pain circuit may be a great advantage *If this course is decided upon the interruption* of the pain path should be undertaken at the point which is safest and as near the site of the disease as is practical A presacral neurectomy, in well-selected cases, is a very beneficial operation which carries a *low risk and may reasonably* be considered where other operations have failed to deal adequately with the disease causing the symptoms

eosinophilia may be helpful in suggesting the condition A positive Casoni test for hydatid disease is not likely to be undertaken as the material for this test is not likely to be available except in places where the condition is frequently seen Guinea-worm cysts may be seen within the abdominal cavity The condition is difficult to diagnose, but its fixed nature within the central area of the abdomen and without obvious connections with the pelvis may suggest the condition in areas where guinea-worm disease is frequently encountered Enquiries should be made to see if the patient has ever suffered from guinea worm disease of the legs

Hæmatocolpos in young female subjects aged 15 to 20 years is not difficult to diagnose An absence of menstrual periods is reported in spite of breast development There is a fusiform swelling in the lower abdomen rather like a full bladder Local examination of the urogenital area shows a completely imperforated hymen The condition can be relieved easily by perforation of the hymen under an anæsthetic It is advisable in these cases to give the patient a course of sulpha drugs following the release of a large quantity of dark-brown chocolate-like blood which fills the vagina and uterus There may be marked congestion of these structures following the release of pressure by the colpotomy, and this may predispose to infection in them

Uterine displacements of a normally sized uterus are not being discussed here They must be recognised in order to avoid errors in diagnosis

PRESACRAL NEURECTOMY IN PELVIC PAIN

In almost all surgical clinics a small number of female patients continue to report periodically for an unduly long time following major pelvic operations They complain that they have a continued vague sense of pelvic discomfort which is difficult to localise The symptoms complained of do not fit into any well classified category which would suggest local pathology On pelvic examination no gross abnormality can be detected In cases of this sort there is in addition to minor residual inflammation almost invariably a basic dissatisfaction with the circumstances of life in which the patient is placed The patient's condition is much aggravated in many instances by not having borne a child for many years, if at all Appreciating the grossly abnormal condition of the pelvis prior to operation it cannot be doubted that some pelvic adhesions and low-grade inflammation still exists though not sufficient to fix the pelvic structures unduly The patient frequently complains that the discomfort is much worse during menstruation, and that she suffers from dyspareunia It may take many months or even a year for the residual inflammation in the pelvis to settle down completely after a major operation even though the primary pathology has been removed Women anxious to have another child find it difficult to exercise patience for a sufficient duration of time to permit of the residual inflammation settling down satisfactorily Sedatives are a help, but patients may not be willing to continue using them for as long as they may be required

If a major operation has been undertaken and there is continued improvement in the patient's condition during convalescence, there is a natural reluctance to undertake further surgery without finding an adequate cause to justify it If

3 "*Conservative Treatment of Early Intestinal Intussusception*" G A De Venecia *J Philipp med Ass* 1948, 24, 123

Intussusception in 75 per cent of cases in children under 2 years Treatment suitable for early cases only (under twenty four hours' symptoms)

Method—Reduction by gas pressure distal to intussusception by introduction of solution sodii bicarb and followed by solution pulv tartaric acid as solutions A and B

For small child

(1) Sodii bicarb solution 1 per cent	180 c c
(2) Pulv tartaric acid 1 per cent	120 c c

Total is 300 c c This forms gas which, with the child in the knee elbow position and the buttocks held together, exerts uniform pressure at the head of the intussusceptum, dilating the bowel and pressing back the intussusceptum

Double dose recommended for adult or double the strength of the solution for the same result (double volume of gas) Same volumes with 2 per cent solution in each case Five cases treated with success The method might reasonably be used in early cases where operation is refused Anæsthetic usually not necessary No fatalities reported

4 "Intussusception in Infancy and Childhood" Y-H Shea *Chin med J* 1955, 73 196

Series of 164 cases noted

Most intussusceptions were noted in infants 141/164 Reduction under screen, using barium enema method

Reduction rate note is of considerable interest

Duration	Reduction Rate
0 to 24 hours	43 per cent
24 to 48 hours	*21 per cent*
48 hours plus	15 per cent

Overall rate 37 3 per cent

Barium enema diagnosis very accurate Reduction by barium enema worth trying for cases seen within twenty four hours

It is claimed that where reduction was not quite complete the operation was of a smaller magnitude and could be done in most cases through a McBirney's incision, and so the procedure was of some advantage although not in itself adequate in these cases

Further analysis

Complete reduction with no operation	19 3 per cent
Complete reduction confirmed at operation	18 0 per cent

5 "Further Studies of Intussusception in Infancy and Childhood" Y H Shea *Chin med J* 1957, 75, 409

(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
... hours
(10)
(11)
(12)
(13) Charcoal given by mouth is usually passed per rectum ... four to six hours

EXTRACTS

1 Laboratory Studies on the Detection and Treatment of Yam Poisoning J L Broadbent and B Reiff at Ibadan Nigeria *W Afr med J* 1956 5 76

Yam concerned is *Dioscoria dumetorum* A clockwise climber,' that is when you look at the plant from the top of the supporting stick, apparently the non poisonous yam climbs in the anti clockwise direction

Poison yam causes

1 Abdominal pains
2 Vomiting
3 Convulsions
4 Respiratory failure

Testing poison yam with Dragondorf s reagent (modified)

Solution A

Bismuth oxynitrate	0 85 gm
Water	40 c c
Glacial acetic acid	10 c c

Solution B

Potassium iodide	8 gm
Water	20 c c

Mix A and B and filter

Use filtrate as spray on extract of the yam concerned or even spray it on filter paper and press the cut yam on the filter paper after the reagent has dried on the paper

Result —YELLOW colour Negative, BRIGHT RED Positive

Extracting the yam Macerate 15 gm of the yam in 10 c c water add a few drops of acetic acid filter and basify the filtrate with sodium carbonate To this add an equal volume of chloroform and shake (this extracts the poisonous alkaloid) pipette off the chloroform solution of alkaloid and drop it on to filter paper allow to dry and then spray on the reagent and see result—Yellow, harmless, *Red, Danger*

Treatment advised Give central nervous system depressants to stop the convulsion action Phenobarbitone suggested and paraldehyde and both would have to be by injection (Might largactil not be suitable ?—C B)

2 Typho d in Bombay City P M Sanghani *Indian J med Sci* 1950, 4 231

Typhoid fever increased in amount and virulence from 1936 to 1948

Year	Total Medical Admissions	Typhoid Admissions	Typhoids	Typhoid Deaths	Typhoid Deaths
			Per cent		Per cent loss
1936	827	140	16 9	14	10 0
1940	1,429	168	11 7	46	22 8
1944	2,247	452	19 9	153	34 2
1948	2 302	802	34 8	112	13 9

The introduction of chloromycetin made a marked d fference in the 1948 period record as it became ava lable about 1946 47 There was a marked reduction in the death rate though the number and percentage of the cases of typhoid had increased constituting a state of almost Public Health Emergency

Pulse-rate changes in the horizontal position with losses of blood

Loss of 500 c c , 3 beats per minute—insignificant
Loss of 1,000 c c , 7 beats per minute—not very obvious
Loss of 1,500 c c , 17 beats per minute—small, considering loss

Tilt " test results

(With 500 and 1,000 c c venesection no constitutional signs noted.)

Pulse readings taken at one, two, and three minutes

500 c c blood removed pulse plus 20 beats—1,000 c c plus 40 beats
14 to 21 c c per kilo body weight 1,500 c c , pulse rose more than 40 beats
Constitutional signs were also present, increased respiration, faintness, sweating, pallor, air hunger, muscle twitching

If with the rise in pulse rate constitutional symptoms arise, the patient should be put back to horizontal at once

Following test, pulse rate returns to normal quickly in healthy person In shocked patient it may take twenty four to seventy two hours to return to pre tilt rate

Conclusions

Tilt response to above normal at 75 degrees indicates blood loss (normal – 10)

Tilt response between 30 and 40 beats per minute when 1,500 lost, syncopal attacks also

If patient shows shock in horizontal position the vascular fluid loss is probably about 1,500 c c.

8 Protective Sleep in Abdominal Surgery" Hsu Ching Yey and S Chia Tung *Chin med J* 1953, 71, 259

Technique as practised in Russia Reported as being excellent One hundred cubic centimetres *of 30 per cent alcohol (ethanol) given per rectum post-operatively Sleep occurs within twenty* minutes Given slowly by rectal catheter, repeat twice daily

This is sometimes replaced by intravenous technique using glucose alcohol

Glucose	25 0 gm
Sodii chloride	4 0 gm
Calcii chloride	1 0 gm
Absolute alcohol	60 0 c c
Distilled water	500 0 c c

Intravenous drip

that 30 drops per minute Total

y This sleep technique continued

for forty eight to seventy two hours

9 Treatment of Portal Hypertension in Liver Cirrhosis by Ligature of Hepatic Artery" E Ruggieri *Arch klin Chir (Langenbeck)*, 1955, 282, 1003 (Valuable statistics —C B)

Measurement of portal pressure in omental vein after operation

Pre-operation venous tension in mesenteric vein	29 7 cm water
After ligature of splenic artery	20 7 cm water
After additional ligature of hepatic artery	11 4 cm water

Further case

Pre-operation pressure in omental vein	37 0 cm water
Following splenectomy	26 0 cm water
After additional ligature of hepatic artery	20 4 cm water

Advantages

(a) Lowers mortality rate to low figure—4 4 per cent in this series
(b) If reduction incomplete, operation can be done through small incision
(c) Shortens hospitalisation to two to four days
(d) Less expensive to hospital and parents

D sadvantages

(a) Underlying organic lesion if present not detected but rare
(b) Most value in ileocolic type (but this most common)

The procedure should be used in cases under twenty four hours duration After that it not likely to be successful

6 "D F P in the Treatment of Paralytic Ileus A Walsh *Irish J med Sci* 1957 p 286

Observations

(1) Morphia helps by relieving pain the precipitating factor

itration than tl required of physostigmin

(7) The inhibitory action of physostigmin is reversible and when the drug wears off t toxic effect recurs D F P fixes cholinesterase
(8) Value is therefore its anticholinesterase fixing action
(9) Cholinesterase acts adversely by blocking the nerve muscle jet (Rather like the cur action —C B)
(10) D F P is given intramuscularly 2 c c dose of preparation which is 0 1 per cent solut in arachis oil (Boots preparation England)
(11) Peristaltic sounds originally absent start within three minutes
(12) Bowel action usually copious within two hours

7 Rupture of Abdominal Organs Estimation of Acute Blood Loss by Tilt Test D Green and D Meth ny *Surg Gynaec Obstet* 1947 84 1045

Surgical requirements in hæmorrhage

(1) Arrest of bleeding
(2) Estimation of blood loss

Acute blood loss 40 per cent and over—fatal In absence of acute blood loss 80 per ce hæmoglobin and 60 per cent protein can be sustained Surgical danger is loss of blood beyo that which can be compensated for Hæmoglobin estimate is not a true estimate of blood loss l of degree of hæmodilution of limited value Not knowing previous hæmoglobin level allows no accurate comparison Blood pressure to pulse rate relation also used but not entirely rel ab as it is easily influenced by fear and heart d sease Reduced blood pressure in hypertensive ca may show normal level when internal hæmorrhage occurs Dye methods of estimation of blc volume complicated and time-consuming Previous level also not known

Essential problem is to know amount of blood necessary to restore original volume

Head-down position improves fainting attack common knowledge Blood pressure taken w patient in horizontal position does not show marked change unless enormous loss of blood occu Blood pressure maintained in horizontal position until very late state

Tilt test worked out in four groups for accuracy Young middle and old aged in anær patients in those with heart disease and in healthy volunteers who were bled to d fferent extent 500 c c 1,000 c c 1 500 c c Standard tilt used for test—75 degrees In t ally three readu of pulse rate taken with patient horizontal to get steady read ng

Then tilt 75 degrees

In healthy patient up to 10 beats rise (not more) maximum
Young healthy adult
In aged patient very little change of rate
In heart disease response variable within normal levels
In anæmias of chron c type slight rise to high normal levels

7 VERWILGHEN, A M (1958) Gastro-duodenal ulcer in Kwango (Belgian Congo) *J Trop Geogr Med* 10, 117

8 PATAL, J C (1950) Etiology and incidence of peptic ulcer *Indian J med Sci* 4, 299

9 EDINGTON, G M (1956) Malignant disease in the Gold Coast *Brit J Cancer*, 10, 595

10 JOLY, B M (1956) Peptic ulcer in Western Nigeria *W Afr med J* 5, 55

11 LIE KIAN JOE *et al* (1956) Mycosis of the stomach caused by a phycomycete *Docum Med geogr trop* 8, 249

12 SCHWARZ, J (1954) A case of torulosis *Docum Med geogr trop* 6, 69

13 DAVIES, P (1957) A fatal case of histoplasmosis contracted in Kenya *E Afr med J* 34 555

14 PHOU B P, *et al* (1953) Acute perforation of gastric and duodenal ulcers *Chin med J* 71, 343

15 WATSON, K C & LAURIE, W (1956) The laboratory diagnosis of typhoid fever *Amer J trop Med* 5, 1051

16 MANSON-BAHR, P E C (1958) Typhoid fever in the African *Cent Afr J Med* 4 120

17 LIE KIAN JOE (1950) Dysentery, typhoid and paratyphoid stools to a laboratory using the drying method *Docum neerl indones Morb trop* 2, 113

18 S *Sci* 4, 231

19 S *n Practit* 9, 639

20 C Saunders Publications

21 *Chin med J* 67, 531

22 I dder in children *Chin med J* 67, 591

23 DAS, K (1957) *Clinical Methods in Surgery*, 5th ed p 2 Calcutta City Book Co

24 WANG, H C, *et al* (1956) Biliary ascariasis *Chin med J* 74, 445

25 FALCONER, D J B (1956) Peritonitis in the West African *W Afr med J* 5, 18

26 WALSH, A (1957) D F

27 DOOLAN, W (1949) D

28 CRUZ, J Z S (1951)

29 HEILBRUNN, A (1950)

30 SMITH, S L H & CL *Chin med J* 67, 193

31 CH'EN MING CHAI & CH'EN WANG CHAN CHU (1957) Acute colonic obstruction in schistosomiasis japonica *Chin med J* 75, 517

32 MICHAEL, K M M & COORAY, G H (1952) A culture method for amœbic infection in Ceylon *Amer J trop Med* 1, 543

33 DAVIES, A M & ELIAKIM, M (1954) The value of antigens in the diagnosis of bilharzia *Amer J trop Med Hyg* 3, 728

34 PESIGAN, T P, *et al* (1951) Intradermal test in schistosomiasis japonica *J Philipp med Ass* 27, 212

35 CHUNG HUEI LAN *et al* (1956) Use of liver ova antigen in immuno diagnosis of schistosomiasis *Chin med J* 74, 340

36 BOLAN, H L (1944) Diagnostic value of blood studies in malignancy *Amer J Surg* 63, 316

37 MURPHY, E F (1955) Antibiotics in bacillary dysentery review of 500 cases *Irish J med Sci* p 523

38 JONES, S H O (1958) Personal Communication from the Director of Medical Services, Gambia From official records Cholera in the Gambia

39 RAO, S V (1953) Dysenteries *Indian J med Sci* 7, 151

40 BOYD, J S K (1957) Dysentery—some personal experiences and observations *Trans roy Soc trop Med Hyg* 51, 471

41 RAIL, G A (1951) Two cases of ulcerative colitis treated with vitamin B_{12} *Lancet*, 2, 816

42 COELHO, G Giardiasis in children *Indian J med Sci* 5, 40

43 KENNEDY, C C & STEWART, R C (1957) Balantidial dysentery *Trans roy Soc trop Med Hyg* 51, 549

44 PHILLIPS, B P, *et al* (1958) Studies in ameba bacteria relationship in amebiasis *Amer J trop Med Hyg* 7, 392

45 CHATTERJI, K K (1927) *Tropical Surgery and Surgical Pathology* London John Ball &

46 LEF lavia *J Serb med Ass* 6, 267

47 HEL tentots of South-west Africa *Cent Afr J Med* 3, 143

10 Piroplasmosis in Man Z Skrabalo *Docum Med geogr trop* 1957, 9, 11

Interesting case of human piroplasmosis reported in a patient who had his spleen removed ten years earlier after a street fight in Zagreb Yugoslavia when he ruptured his spleen

11 Notes on Human Hydatid Disease in Kenya J R Wray *E Afr med J* 1958, 35 37

Fifteen cases operated on in three years

ANIMAL INFECTION RATE

Abdominal Tumours without Gut Obstruction	European Stock		African Stock	
	1954	1955	1954	1955
Cattle	17 1	17 6	46 7	41 1
Sheep	23 7	28 4	41 9	53·0
Goats			18 03	15 2

Most cases operated upon were infection of liver and mesentery

12 *Typhoid Fever in the African* P E C Manson Bahr *Cent Afr J Med* 1958 4 120

Recommends the Diazo reaction as a test for typhoid fifth to fourteenth day Very useful in country stations if no bacteriology facil ty available False positives may occur in

Bacillary dysentery
Pneumonia
Pulmonary tuberculosis

But these can be excluded on clinical grounds usually

Two solutions required

(1)	Sulphonilic acid	0 5 gm
	Concentrated HCl	5 0 c c
	D stilled water	100 0 c c
(2)	Sod um nitrite	0 5 gm
	D stilled water	100 0 c c

Add together Solution (1) 40 parts Solution (2) 1 part Keep in refrigerator for use as required Make up fresh twice a week or so

Test an equal part of urine and reagent and add a few drops of ammon a 30 per cent solution Pos tive test indicated by pink colour developing Orange to yellow—ignore

REFERENCES

1 COLBOURNE M (1956) The effect of prolonged examination of blood films on the parasite rate *W Afr med J* 5 26
2 GAMBLE M G & HARRIS F C (1953) *Pseudomonas pyocyanea* simulating enteric fever during antibiotic treatment *W Afr med J* 2 79
3 HOLGATE J (1954) Fatal cas of *Ps pyocyanea* infection *W Afr med J* 3 145
4 BROADBENT J L & REIFF B (1956) Laboratory stud es on th detection and treatment of yam po soning *W Afr m d J* 5 76
5 MISRA S (1953) Infection of the cervix and vagina by protozoa *F histolytica* *J Obstet Gynaec Ind a* 3 306
6 FEENEY J K (1956) Broad l gament pregnancy and case not s *Ir h J m d Sci* p 92

87 Browne, M P (1950) Strangulated hernia in infants *Brit med J* 2, 629
88 Gelfand, M (1955) Congenital pyloric stenosis in an African patient *Cent Afr J Med* 1, 99
89 Luder, J (1956) Congenital pyloric stenosis *E Afr med J* 33, 100
90 Petcher, P (1953) Congenital hypertrophic stenosis in two West African children *W Afr med J* 2, 210
91 Marks, C (1955) Congenital hypertrophic pyloric stenosis in an African infant *Cent Afr J Med* 1, 95
92 Huang, T T (1954) Further report on congenital hypertrophic pyloric stenosis occurring in siblings *Chin med J* 72, 262
93 Goni Morenco (1940) XIIth Congress Argentino di Cirurgia, pp 85-87
94 Koontz, A R & Graves, W J (1954) Pre-operative pneumoperitoneum as an aid to handling of gigantic herniæ *Ann Surg* 140, 759
95 Reid, R D (1934) An unusual strangulated hernia *W Afr med J* 8 (Old Series), 11
96 Bowesman, C (1951) *Reduction of strangulated inguinal hernia* *Lancet*, 1, 1396
97 Bowesman, C (1952) Reduction of strangulated inguinal hernia *Lancet*, 1, 822
98 Monro, A K (1951) Reduction of strangulated inguinal hernia *Lancet*, 2, 839
99 Wangensteen, O H (1955) *Intestinal Obstruction*, 3rd ed p 372 Springfield, Ill Thomas
100 Wolf, J (1956) Patent omphalomesenteric duct with *Ascaris lumbricoides* infection *J trop Med Hyg* 59, 134
101 Clezio, E le (1934) Fish bone as cause of fæcal fistula *W Afr med J* 8 (Old Series), 12
102 Green, D M & Metheny, D (1947) Estimation of acute blood loss by the tilt test *Surg Gynec Obstet* 84, 1045
103 Wilson, W S (1955) Volvulus of stomach *Cent Afr J Med* 1, 218
104 Huang, T-T & Chang, C-C (1956) Portal hypertension *Chin med J* 74, 37
105 Aird, I (1957) Surgical treatment of portal hypertension *Cent Afr J Med* 3, 393
106 Ibrahim, H (1957) Combined ligation of hepatic and splenic arteries in Egyptian splenomegaly *J Egypt med Ass* 40, 253
107 Shaper, A G (1953) Liver function suitable for tropical practice *Trans roy Soc trop Med Hyg* 47, 324
108 Mallen, M S, *et al* (1950) Precipitation of abnormal serums by Lugol's solution *Amer J clin Path* 20, 39
109 Woolf, C R (1951) A simple bedside test for liver function *S Afr med J* 25 (ii), 789
110 Logatcheva, V N (1957) Splenectomy combined with omentonephropexy in treatment of portal hypertension *Khirurgiya*, 1, 46
111 Lan, H-C, Yao, C W & Chien, C-E (1954) Surgical management of portal hypertension. *Chin med J* 72, 118
112 Garcia, G (1957) Portal hypertension *J Philipp med Ass* 33, 435
113 Huang, T-T (1954) Splenorenal anastomosis by the trans-abdominal approach *Chin med J* 72, 461
114 Ruggieri, E (1955) Treatment of portal hypertension in liver cirrhosis by ligation of hepatic [illegible]
115 [illegible] 6
116 [illegible]
117 [illegible] ld
118 Skrabalo, Z (1957) First observations of piroplasmosis in man *Med Rev* [illegible] 1
119 Skrabalo, Z (1957) Piroplasmosis in man *Docum Med geogr trop* 9, 11
120 Unsworth K (1952) Studies on *Trypanosoma vivax* *Ann trop Med Parasit* 46, 85
121 Walters, J H (1949) A case of indigenous kala azar in the Gambia *Trans roy Soc trop Med Hyg* 43, 287
122 Findlay, G M, Boulter, E A. & McGibbon, C B (1947) A note on flying and sickling *J roy Army med Cps*, 89, 138
123 Ishak, K G, *et al* (1957) Needle biopsy in the etiological diagnosis of splenomegaly *Amer J trop Med Hyg* 6, 257
124 Simon, G (1857) Die Exstirpation der Milz am Menschen Gieesen, 1857 Quoted, *Surgery*, Allen *et al* 1957 Pitman Medical
125 *Wells, Spencer (1931)* Hæmolytic icterus Quoted, Lord Dawson of Penn *Brit med J* 1, 963
126 Hsu, T-Y & Hsiao, H F (1950) Traumatic rupture of the spleen *Chin med J* 68, 281
127 Raper, A B (1951) Splenosis, a sequel to ruptured spleen *E Afr med J* 28, 265
128 Chung, H-L & Cheng, H C (1957) Primary carcinoma of liver *Chin med J* 75 295

48 ISAACSON, L C (1956) Some observations on amœbiasis in the coloured population of Durban *S Afr med J* 30 (i), 292
49 TUPAS, A V & DAUIS LAWAS, D F (1951) Liver complication of amœbiasis in children *J Philipp med Ass* 27, 397
50 HUSSEY, K L & BROWN, H V (1950) Complement fixation for hepatic amœbiasis *Amer J trop Med* 30, 147
51 MCDEARMAN, S A & DUNHAM, W B (1952) Complement fixation as an aid to diagnosis in extra intestinal amœbiasis *Amer J trop Med Hyg* 1, 182
52 KASLIWAL, R M (1954) Clinical manifestations of amœbiasis *Indian J med Sci* 8, 741
53 ARMSTRONG, W (1949-50) Case of cutaneous amœbiasis *Trans roy Soc trop Med Hyg* 43, 79
54 SHAW, H M & HUGHES, E S K (1951-52) A case of amœbiasis with extensive ulceration of the skin *Aust N Z J Surg* 21, 312
55 BROWNE, M P (1957) Personal Communication Ghana
56 PURANDARE, N M (1953) Intussusception due to amœbic colitis *Indian J med Sci* 7, 288
57 RADKE, R A (1955) Amœboma of the intestine *Ann intern Med* 43, 1048
58 ANDERSON, G V W (1953) Surgical complications of amœbiasis *E Afr med J* 30, 467
59 MATHUR, T N (1955) Hepatitis in Brucellosis *Indian J med Sci* 9, 57
60 LOUW, J H & WILKIE, W (1956) Infestation by *Fasciola hepatica* *S Afr med J* 30 (ii), 1157
61 CHIN, K Y (1955) Primary mucinous carcinoma of the liver associated with *Clonorchis sinensis* infection *Chin med J* 73, 26
62 HOPELLI, R & WU, C L (1952) Parasitic infection of the human liver *Chin med J* 70, 182
63 TRIBEDI, B P (1951) An uncommon complication of amœbic liver abscess *Indian J med Sci* 5, 242
64 GORDON, G (1956) Amœbic pericarditis *S Afr med J* 30 (ii), 866
65 ALEXANDER, G L (1933) Note on avulsion of the phrenic nerve in a case of liver abscess *W Afr med J* 7, 103
66 ADAMS, A R D (1956) The treatment of intestinal amœbiasis *Trans roy Soc trop Med Hyg* 50, 109
67 GELFAND, M & ROSS, W F (1953) Distribution of schistosome ova in the genito-urinary tract *Trans roy Soc trop Med Hyg* 47, 218
68 P'AN JU-SUN (1957) Rectosigmoidoscopy in schistosomiasis japonica *Chin med J* 75, 28
69 LING, C-C, CHENG, W-J & CHUNG, H-L (1949) Clinical and diagnostic features of schistosomiasis japonica *Chin med J* 67, 347
70 BIGGAM, A G & ARAFA, M A (1930-31) The sigmoidoscope as an aid in the diagnosis of dysenteric conditions in Egypt *Trans roy Soc trop Med Hyg* 24, 187
71 GUZMAN, F C (1953) Non-localising acute appendicitis *J Philipp med Ass* 29, 57
72 FAIN, A (1957) Calculose vesicale et avitaminose A chez les enfants au Ruanda Urundi *Ann Soc belge Méd trop* 37, 135
73 EVANS, P A S (1956) An unusual case of acute abdomen in a child *Cent Afr J Med* 2, 274
74 MENEZ, S C (1954) Non-surgical appendicitis *J Philipp med Ass* 30, 508
75 GUZMAN, F C (1948) Painless appendicectomy *J Philipp med Ass* 24, 429
76 CHEN, Y-T & HSIAO, H-F (1949) Appendicitis in Nanking *Chin med J* 67, 321
77 ANDERSEN, D A (1956) Observations on intestinal obstruction in rural India *Indian J med Sci* 10, 937
78 BURKITT, D P (1952) Acute abdomens, British and Buganda compared *E Afr med J* 29, 189
79 MILLAR, J R M (1955) Five years abdominal surgery at Kisumu *E Afr med J* 32, 219
80 HOFFMAN, C S (1957) Personal communication Ghana
81 CHIU, S-H (1958) Oxygen treatment in ascariasis in children *Chin med J* 77, 151
82 MA, A-C & YIN, M-C (1955) Acute intestinal obstruction in infancy and childhood *Chin med J* 73, 307
83 LU, W-S (1950) Malformations of the rectum and anus *Chin med J* 68, 123
84 SHEA, Y-H (1957) Further studies on intussusception in infancy and childhood *Chin med J* 75, 409
85 SHEA, Y-H (1955) Intussusception in infancy and childhood *Chin med J* 73, 196 (Abstracts)
86 DE VENECIA, G A (1948) Conservative treatment of early intestinal intussusception *J Philipp med Ass* 24, 123

8

Diseases of the Rectum

ANAL PRURITUS

PATIENTS in the tropics seldom complain of irritation about the anus without some obvious pathology being present Pruritus ani without apparent gross disease to account for it is seen more commonly in highly educated patients who are of the nervous and irritable type In this type of patient it may be extremely difficult to find an adequate cause to account for the symptoms complained of There are six main groups of conditions which give rise to irritation about the anus

1. Gross rectal pathology
2. Perianal infections
3. Drug idiosyncrasies
4. Local parasitic infestations
5. Irritations due to food contents
6. A group for which no cause can be found

The most commonly encountered cause of pruritus ani noted has been a *thrombosed pile whether this be external or internal* After the initial acute pain has passed off there is a residual irritation lasting for one or two weeks An anal fissure initially extremely painful later becomes rather itchy Some cases of pruritus ani in male patients may be found on investigation to be due to chronic *prostatitis* *Referred pain from various parts of the genito-urinary tract* have a well localised distribution and these are common knowledge It will be noted that when a cystoscope is passed along the urethra into the bladder in a male patient there is a marked sense of perianal discomfort as the instrument goes through the prostatic urethra This simple observation would suggest that referred pain from the prostate is localised to about the perianal area

Pruritus ani may follow the administration of a native enema Women in the tropics tend to use enemata for the treatment of various abdominal complaints much more frequently than do male patients Some female patients who have pruritus ani have been found to have a ring of ulceration in the upper third of the vagina This is due to the earlier insertion of an irritant tampon in that position, which is a common practice in some areas of Africa although it does not exist at all in other places This condition should be considered when investigating cases of pruritus ani in districts where the practice of using such tampons is known to be common As there is a sense of irritation associated with the healing of any wound, so there may be a referred irritation following settling down of any form of gross inflammation

129 LIU Y (1953) Primary carcinoma of the liver *Chin med J* 71 183
130 NAVARRO M D & NAVARRO R P (1957) Beard antrone test *J Phil pp med Ass* 33 740
131 ARNBRUST A (1957) Rare h stopathologic aspects of Manson s schistosomiasis *Amer J trop Med Hyg* 6 731
132 SOMOGYI M (1938) M cro methods in estimation of diastase *J b ol Chem* 125 399
133 LAN S C *et al* (1954) Acute pancreat tis *Ch n med J* 72 382
134 GUZMAN F C. (1955) Pancreatitis among Filipinos *J Phil pp med Ass* 31 523
135 WILSON T G (1953) Thym c death *Irish J med Sci* p 367
[illegible] 25 307

[illegible] *Chirurg* 25 175
140 KOBERLE F (1958) Megacolon *J trop Med Hyg* 61 21
141 SWENSEN O (1950) A new surg cal technique for Hirschsprung s d sease *Surgery* 28 371
142 BOWESMAN C & CHENARD A H (1948) Full term intra abdominal ectop c pregnancy *I h J med Sci* p 132
143 TIEN SHUEH PING *et al* (1956) Hydatidiform mole with reference to the quantitative dilut on test *Cl n med J* 74 258
144 WRAY J R (1958) Notes on human hydatid d sease in Kenya *E Afr med J* 35 37

generalised pruritus, but again there may be marked anal pruritus present when this drug is employed Many patients cannot tolerate hetrazan unless they are given an antihistamine drug in addition to counteract its irritant effect In mild cases it may give rise to pruritus ani only

Monilia infections are most commonly seen about moist parts of the body The fungus condition most commonly seen due to a Monilia is the "thrush infection" of infants Many clinical observations indicate that with the free use of antibiotic drugs in recent years, which kill off intestinal bacteria, the fungoid conditions increase very rapidly

Weinberg[2] noted that whereas before the use of antibiotic drugs Monilia infection was present in the rectum in only 6 per cent of patients, after treatment with an antibiotic drug the rate of infection with rectal moniliasis was increased to 33 per cent In another series tested before and after treatment with an antibiotic drug, the infection rate with rectal moniliasis increased from 20 to 59 per cent on the fifth day after the start of treatment With the rise of rectal moniliasis there is a corresponding rise in anogenital skin infections with Monilia Where there is no very obvious cause of the pruritus ani noted, moniliasis should be looked for It is advisable in such cases to enquire if a course of antibiotic drugs has been administered recently

Local intestinal parasites are well known to be a cause of anal irritation. Threadworms should be looked for The ova can be detected easily, using the sellotape method of collecting the ova from the perineal skin for microscopic examination The methods of treatment have been indicated already in an earlier chapter Tapeworm segments sometimes seen in patients in the tropics may also cause pruritus as they migrate The necessity for stool examination for the various forms of intestinal parasites in cases of pruritus ani is obvious Infection with *Trichomonas vaginalis* is also a cause of the condition and so should be looked for

On rare occasions in the tropics a guinea worm or a filarial worm about the perineal tissues gives rise to violent irritation The treatment of the various forms of filarial worms is considered in the chapter on Filarial Diseases

Irritation of the anal canal by the use of highly seasoned food is seen frequently Pepper grows very easily in most tropical countries and is used by the local people very freely If pepper is not the only cause producing anal irritation in a particular case it certainly aggravates any other cause which may be present such as hæmorrhoids, fistula or fissure Patients require instruction regarding the use or limitation of condiments with food Curries should be restricted in patients suffering from any form of anorectal pathology If an obvious cause of rectal irritation is found to account for the irritation complained of it should be treated Surgical conditions which may cause the symptoms of pruritus ani will be discussed under various headings It is necessary in all cases of pruritus ani to exercise careful personal hygiene to ensure adequate cleanliness The high temperatures and high humidity found is most parts of the tropical world necessitate even greater care in this respect than is required in the non tropical world to ensure that the skin is kept clean and healthy

A fistula in-ano gives rise to pruritus for two reasons First, because of the inflammation associated with the preceding ischiorectal abscess The inflammation settles down after the release of pressure through the fistula-in-ano Secondly, because the pus discharging from the fistula irritates the skin surfaces

Malignant disease in the lower rectum, and particularly if this involves the anal canal, may on occasions give rise to pruritus ani, though not constantly so It is necessary in all cases of pruritus ani to examine the rectum carefully to exclude any form of gross pathology

Following an attack of dysentery, whether this be bacillary or amœbic, there is usually marked tenderness about the anal canal As the discomfort improves, a sense of irritation is experienced for several days following the attack. Although intermittent diarrhœa may occur in cases of schistosomiasis of the rectum and colon, no cases of pruritus ani have been noted which have been thought to be due to this condition

Perianal infections are seen in remote country villages due to secondary yaws The patients invariably live far away from medical centres Children are commonly seen scratching such lesions Fortunately yaws is rapidly becoming extinct with the free use of arsenical and bismuth preparations as well as penicillin and other antibiotic drugs

Cases have been noted in European female patients living in the tropics where *pruritus ani was caused by a subacute attack of vaginitis Microscopic* examination of the local discharge showed a heavy infection of spirochætes and fusiform bacilli In almost all these cases there was also an accompanying skin infection of the groins and pubic areas, in which a heavy growth of fungus was detected The cases were treated by intravenous novarsenobenzol and local mercurial applications to the skin areas involved, following shaving All the cases cleared up quickly Most of these patients were seen several years ago at a time when there was no penicillin available for treatment

Various forms of dermatitis may affect the perineal area, giving rise to pruritus Condyloma acuminata about the perianal area have been noted in African patients as a cause of pruritus ani on a few occasions The condition was treated by local application of diathermy It is necessary to examine a patient with this condition very carefully in order to avoid overlooking minute lesions elsewhere This condition advances much more quickly if the patient is pregnant Baker [1] claims excellent results in the treatment of condyloma acuminata by the use of "Triple Sulpha Cream," applications being made twice a day for two or three weeks

Pruritus may occur as a general symptom throughout the body but these cases need not be considered here

Certain drugs give rise to perianal irritation The condition is not uncommonly seen in patients who are given Yatrin tablets by mouth for bacillary or amœbic dysentery Chloroquin given as Aralin or Resochin may also cause pruritus ani It will be noted that any drug which gives rise to localised irritation of the hands is very liable to give rise to pruritus ani to a lesser extent Streptomycin may give rise to pruritus ani but there is usually a generalised irritation present also in these cases Hetrazan or Banocide also give rise to a

stricture Enquiry should be made regarding the ease or otherwise of passing urine It is most unwise to operate on a patient for hæmorrhoids if a urethral stricture is present in addition If operation is undertaken in such a case post operative retention of urine is very likely to occur It may not be possible following the operation in these cases to pass urethral sounds or a metal catheter into the bladder The very limited urethral passage becomes congested due to the operation performed on a near-by area and the venous obstruction induced by the overdistended bladder In these unfortunate circumstances it is necessary to perform a suprapubic cystotomy to drain the bladder

Some patients complaining of hæmorrhoids are found on examination to have no piles present at all In these cases more explicit details of the actual complaint are needed The patient may be complaining of having seen blood in the stools which he believes to be due to hæmorrhoids The painless passage of blood per rectum is sometimes due to schistosomiasis of the rectum This condition must be kept in mind in areas where schistomiasis of any sort is found The painless nature of the bleeding associated with urinary schistosomiasis is well known The condition becomes painful only when secondary infection is super imposed In cases of rectal bleeding with schistosomiasis, which are not very commonly seen in West Africa, it is usual to find a rectal polypus present from which the bleeding is coming A few cases have been seen where a patient complained of hæmorrhoids when in fact a cherry-like polypus was found protruding from the anus, and this was found on examination after removal to be due to schistosomiasis *Schistosoma mansoni* does not often give rise to gross blood in the stools unless a polypus is present Rectal amœbiasis does not often give rise to symptoms which suggests hæmorrhoids to the patient

An acute thrombosed external pile is a condition which is most often seen in young adult patients It comes on suddenly and is acutely painful Patients resent examination because of the discomfort present A small, tense, spherical swelling is present under the skin at the anal margin In almost all cases where patients complain of acute anal pain a thrombosed external pile or an anal fissure will be found to exist An anal fissure frequently has a "sentinel pile" at its lower end

Any condition which gives rise to thickening or infiltration of the wall of the rectum may predispose to the formation of hæmorrhoids because of interference with free drainage of the veins back into the main veins of the pelvis The inferior and middle hæmorrhoidal veins drain into the systemic system of veins while the superior hæmorrhoidal veins drain into the portal system There is a free communication between the upper and lowermost hæmorrhoidal venous system The possibility of hæmorrhoids being secondary to carcinoma of the rectum should be considered and sigmoidoscopic examination carried out before operating on a case for piles

A mucosal prolapse of the rectum is understandably sometimes termed hæmorrhoids by the patient In almost all these cases the condition is secondary to a urethral stricture and chronic straining in order to evacuate the bladder

In adult male patients in the tropics who develop hæmorrhoids the possibility of some form of liver obstruction being present should be remembered With

Dermatitis about the pubes, perineum and groins which may be associated with pruritus ani is much more easily treated if pubic hair is shaved off completely. Many of the skin infections which are of a mixed type, containing fungus and bacteria, can be cured quickly by the use of Whitfield's ointment applied each morning and washed off in the evening. This is followed by an application of 1 per cent. biniodide of mercury in spirit solution. This form of treatment is rather painful but very effective. The biniodide solution gives a very sharp stinging feeling for about one minute following application, but in view of the advantage gained, most patients are willing to accept this temporary discomfort. They should be warned of this beforehand.

Cases of moniliasis are very effectively treated by the use of Mycostatin ointment, which is an antibiotic substance. Hydrocortisone acetate ointment is very useful in cases of skin infection with marked lichenification present. The ointment is used twice daily.

Active surgical measures are rarely indicated for pruritus ani. Ball's operation has been employed on a few occasions; the results were not very satisfactory. Two semilunar incisions are made round the lateral aspects of the anus, leaving a bridge of skin fore and aft in the middle line. The incisions are made 2 cm. from the anal margin and do not encroach on the position of the ischial tuberosity. The perianal skin is undermined with a view to cutting the cutaneous nerves supplying sensation to the anal area. The operation leaves an ugly scar in a very sensitive area. Although the skin of the perineum does not tend to form keloid tissue in patients in the tropics who might otherwise form keloids elsewhere on the body, there is an unpleasant temporary thickening for several months in the scar formed. The scar may be even more uncomfortable than the irritation for which the operation was carried out. Krause's operation, with the same object in view—of cutting the subcutaneous nerves—is undertaken by making four radiating incisions from the anus, each of these about 1 in. long and placed in the 2, 4, 8 and 10 o'clock positions. Through these incisions the skin is undermined and the nerves cut. This procedure has not been used personally. It is claimed that with this technique there is less risk of devitalising the perianal skin. Injection treatment of the perianal area with alcohol or effocaine is not advocated. Young adult patients with this condition may be improved by ¼ gr. doses of phenobarbitone. They should be encouraged to lead an active life, taking part in communal sports; by so doing they lay much less emphasis on the condition from which they are suffering.

HÆMORRHOIDS

In dealing with patients in the tropics who complain of hæmorrhoids it is necessary to accept the diagnosis with reserve. The terms "hæmorrhoids" and "piles" may be used for any anorectal condition. The patient must be examined carefully in all cases. A digital examination is essential as a preliminary procedure. The frequency of urethral stricture in male patients in the tropics must be kept in mind, as many cases of piles are secondary to chronic straining in an effort to empty the urinary bladder against the obstruction of a posterior urethral

occasions, a nylon suture should be attached to the tube alone so that if the tube slips into the rectum inadvertently it can be withdrawn later by pulling on the nylon suture If a stitch is not applied to the rubber edge and the tube goes into the rectum completely, it is necessary to give the patient an anæsthetic to remove it A safety-pin transfixed through the rubber tube serves the same purpose and is a useful alternative method

All patients should be given a course of sulphaguanidine or sulfasuxidine before an operation for hæmorrhoids, this decreases the risk of spreading infection following operation Streptomycin is not usually employed unless the piles are inflamed and infected before operation is undertaken No fatalities have ever been noted personally following operations for piles, the risk is very low indeed A patient does not really appreciate the benefit of a hæmorrhoids operation fully for at least four weeks after operation, as it takes some time for the local inflammation to settle down

ANAL FISSURE

An anal fissure is a tear in the skin lining of the anal canal The tear is thought to extend from the pectinate line above to the external skin position below, but whether this be the case or not is not absolutely certain It has already been noted that there is a much higher incidence of imperforate anus in infants in the tropics than in infants in temperate climates The proctodeal membrane which separates the proctodeum below from the gut above may be completely imperforate at birth, this constitutes one of the forms of imperforate anus In some cases the membrane is perforated but the opening is small, this accounts for one form of congenital rectal narrowing, there being a wide shelf of proctodeal membrane remaining The posterior part of this residual membrane is much wider than the anterior part This may account to some extent for the fact that about 90 per cent. of anal fissures are found in the posterior part of the anal canal The remains of the proctodeal membrane becomes gathered up into a series of small pockets known as the sinuses of Morgagni The term "pectineal line" is also applied to this anatomical formation "Pecten" means "a comb," or coxcomb-like appearance, indicating the denticulate nature of the remains of the membrane

At the bottom of the sinuses adjacent to the muscular wall of the rectum there are small pit-like recesses present These proceed for a variable distance down the anal canal between the anal canal lining and the muscular wall, or in some cases into the muscular wall adjacent to them They are important structures, though minute, relative to the pathology which affects the area If an anal fissure was due to the tearing effect alone of constipated motions being passed, almost 100 per cent of the population would suffer from anal fissure at some time or another, but this is not the case There must obviously be some other factor present precipitating the condition It seems probable that if the sinuses of Morgagni are in a healthy condition the passage of constipated motions alone will not produce a fissure It is likely that the true cause of an anal fissure is that a primary inflammation occurs in one of the anal pits which forms a minute

the high incidence of primary carcinoma of the liver in patients in the tropics, particularly African patients, this condition must be kept in mind as a possible cause of hæmorrhoids Primary carcinoma of the liver is about thirty times more common in African patients than European patients and about ten times more common in Asiatic patients than in Europeans

If a patient complains that a pile is worrying him but on examination no pile is detected, it is sometimes found that what he calls a pile is a tag of skin close to the anal margin. A skin tag of this sort represents an area of stretched skin which remains following the occurrence of a thrombosed external pile which has been absorbed slowly The presence of this piece of abnormal skin annoys the patient even though it is harmless otherwise A skin tag is easily removed, and to do so gives the patient mental relief Its presence becomes rather a mental obsession more than a physical discomfort The skin tag is better removed if the patient complains of it, and this is only a minor surgical procedure

Although carcinoma of the rectum is less common in patients in the tropics than in patients in temperate climates the condition should always be looked for where piles are complained of Schistosomiasis and amœbiasis should also be looked for at the same time

Before operation on a case of hæmorrhoids the level of a patient s hæmoglobin should be noted Although the operation risk in hæmorrhoid cases is very low indeed, it may be quite serious if there is a large hæmorrhage following operation in a patient who is already depleted of blood by repeated pre-operative hæmorrhages The average hæmoglobin level of patients in the tropics is much below that seen in patients in temperate climates, being in the region of 60 per cent even in the absence of an obvious pre-operative hæmorrhage

A very much larger number of cases of grossly inflamed hæmorrhoids have been noted in the tropics than in temperate climates The teaching regarding these cases was, in the pre-antibiotic days, to leave the case alone, using baths, sedatives and dressings, and not to operate on the condition until the inflammation had settled down completely The patient is usually in great distress and the condition settles down slowly, taking several weeks The practice in these cases has been adopted of giving the patient a course of streptomycin or chloramphenicol for three days, to decrease the risk of a spread of infection, and undertake a hæmorrhoidectomy at this stage No adverse results have been noted It is necessary to be careful not to remove too much tissue, much of the swelling is due to the inflammation and settles down when the infection is controlled

Hæmorrhoids in female patients are greatly aggravated by pregnancy If piles are troublesome during pregnancy, a patient should be examined three months after her child is born to see if an operation is necessary The hæmorrhoids are liable to become progressively worse with each successive pregnancy if not operated upon

Very few patients over the age of 30 years have not some mild degree of hæmorrhoids These may not cause any inconvenience and may be considered within normal physiological limits No operation is indicated in such cases A high proportion of persons develop thrombosis of a vein about the anal canal at long irregular intervals These cases usually do not call for treatment and settle

by the judicious use of mild aperients, sedative medicines and antibiotic drugs Pepper and spices in food should be avoided Complete rest is a great advantage if this is possible If in spite of these measures the fissure does not heal, remains painful and has a tendency to bleed, it is advisable to give the patient an anæsthetic and undertake an internal sphincterotomy Care must be taken not to damage the external sphincter muscles While the patient is anæsthetised a very limited excision of the fissure track is undertaken, the narrow strip of mucous membrane only being removed The track removed should be slightly wider at the lower than the upper end The sentinel pile if present at the end of the track is removed at the same time The use of a small skin graft kept in position by a pack sutured over it has been advocated by Hughes [3] to ensure more rapid healing, but this seems a rather unnecessary refinement for the average case which heals quite quickly in most cases

ISCHIORECTAL ABSCESS

This condition is, as the name implies, an abscess in the ischiorectal fossa The area concerned is limited laterally by the fascia covering the obturator internus muscle and medially above by the fascia on the lower surface of the levator ani muscle, the lower part of the medial boundary is formed by the sphincteric muscle system of the anal canal An ischiorectal abscess is the most common form of the wider classification of anorectal abscesses seen in African patients Anorectal abscesses include all the abscesses found in relation to the rectum which are extraperitoneal in position An accumulation of pus above the levator ani muscle but extraperitoneal in position is termed a pelvirectal abscess, or abscess of the supralevator space This type of abscess has been seen only on rare occasions in the tropics Small abscesses may occur under the mucous membrane of the rectum or anal canal, but these are seen infrequently It is of interest to compare the relative frequency of the various forms of anorectal abscesses in North American patients and those of Africa The figures of Allen, Harkins, Moyer and Rhoads [4] are used for comparison with a personal series Fig 71 shows, one on each side, the percentage incidence of the various forms of abscess in the two groups

Whereas the incidence of the condition in male patients in Europe is about four times greater than in female patients, it is noted that in African patients the condition occurs in the proportion of twenty to one as in male to female patients Ischiorectal abscess and fistula-in-ano are seen almost exclusively in male wards A collection of pus in the ischiorectal area is a most painful condition Patients seeking treatment are usually carried into hospital Women suffering from this condition may be admitted in quite a hysterical state, making it impossible to examine them adequately without giving them an anæsthetic because of the severe pain Patients requiring opening of an ischiorectal abscess are better given a strong sedative immediately on admission to hospital, and after a few hours rest in bed, sent to the operating theatre They are better not sent to the theatre immediately, as they may have a full stomach and the immediate administration of an anæsthetic would be dangerous

abscess This condition is sometimes called cryptitis The abscess bursts into the anal canal and the unhealthy inflamed mucous membrane is then torn by the passage of constipated motions over the ruptured minute abscess cavity It is difficult to confirm whether this is the case or not, but if a careful history is taken from a patient with an anal fissure at an early stage it will not infrequently be found that prior to the onset of the acute pain associated with the fissure there was a sense of anal discomfort and throbbing present for a day or two before the fissure occurred An anal fissure may on rare occasions be tuberculous A case of this nature was seen in an indigenous patient in the tropics on one occasion On examining the anal canal and rectum it was found that there was an extensive tuberculous ulcer present above the anal canal No doubt one or more of the anal pits had become infected with a tuberculous process and a minute tuberculous abscess formed which ultimately produced a tuberculous fissure The condition, though very rare, should be considered if the track of an anal fissure is wide and there are jelly-like covering granulations present which are typical of tuberculous conditions

An anteriorly placed anal fissure is rare though it is said to occur more frequently in female than in male patients The reason for this is not known Most patients complaining of anal fissure are young adults It should be remembered that an anal fissure may occur in infants though it is seldom looked for If a young child is noted to cry during or immediately after the passage of motions, an examination should be made to see if this condition is present A small sentinel pile forms in these cases and this can be seen quite easily

If a patient complains of pain within the anal canal and no abnormality can be detected on examination, but there is some discomfort present on digital examination, it is advisable to give a course of an antibiotic drug such as streptomycin or chloromycetin, as in such cases an inflamed anal pit is likely to be present and this is a potential source of danger If a minute abscess does form it may break down and an anal fissure occur, but if the inflammation extends through the muscular layers the ischiorectal fossa becomes involved and an ischiorectal abscess forms, and subsequently a fistula-in ano develops which is very serious

The anal canal is a very sensitive structure up to the level of the pectinate line It is lined by modified squamous epithelium Above this level the type of sensation alters, though there is a definite type of sensitivity present

Treatment of anal fissure may be conservative or operative Those more interested in medicine than surgery advocate medical measures, aperients, sedatives and antibiotics Those more interested in surgery tend to recommend stretching of the anal sphincter muscle and excision of the fissure The use of internal sphincterotomy under local anæsthesia is being employed with increasing frequency and popularity A large proportion of persons in any community has suffered from anal fissure for a few weeks at some time in their lives, but on examining the operation records for any hospital it is noted that very few cases of anal fissure are ever excised There is no doubt whatever that the majority of cases of this sort get well spontaneously without any form of surgical treatment They usually take several weeks to do so The rate of healing is much accelerated

abscess the pus when examined is found to contain gram negative bacilli The pus usually has a rather offensive characteristic smell On no occasion has any evidence ever been found, personally, to indicate that an ischiorectal abscess is secondary to an amœbic condition of the rectum If this form of abscess is allowed to develop and burst spontaneously, the opening occurs much more laterally than is desirable A fistula-in ano subsequently develops and so it is desirable to keep the incision as close to the anus as possible when draining the abscess, as by so doing the subsequent area to be excised with the excision of the fistula is reduced to a minimum The nerve and blood vessels supplying the anal canal area descend from above and from the lateral aspect of the ischiorectal fossa, it is therefore suitable to open an ischiorectal abscess using a radially disposed incision The incision should not be unduly long, but if a large abscess is present it is desirable to insert a finger into the cavity in order to break down any loculations Following the evacuation of the pus the pain is greatly reduced The gauze pack can be removed within forty-eight hours, by this time it is soaked in pus and comes out quite easily After this dressing, it is necessary to insert only a small piece of gauze into the wound to keep the edges apart for a further day or two, the main cavity need not be packed any further It is advisable to give the patient chloromycetin before the operation is undertaken, as well as for three days following it, this decreases the risk of spread of infection by Gram-negative bacilli

The most suitable position for an incision for drainage is usually quite obvious in a well developed abscess If the case is seen at a fairly early stage when the pus is not well localised or fluctuating, it is advisable to get the patient to flex the hips and the knees in bed and feel the inflamed area gently, ascertaining and marking the most sensitive position When the patient is under an anæsthetic this area can be opened where it is marked

The quantity of pus present in an ischiorectal abscess does not usually exceed 4 oz If a very much larger quantity of pus is evacuated from the abscess cavity at the time of incision, suspicion should be aroused as to the possibility of the abscess communicating with a larger cavity containing pus above the level of the levator ani muscle A supralevator abscess may contain up to a pint of pus If the amount of pus coming out of the ischiorectal fossa is larger than that which it could contain, it must obviously be coming from some other place With this in view the lower surface of the levator ani muscle should be palpated with the tip of the finger to see if there is not a small opening in the muscle going through to the supralevator space In one case of this type, in a female atient, it was found that on palpating the under surface vator ani mu was a discrete circular opening in the muscle abo f a lead pe

On rare occasions an ischiorect ay be asso a tuberculous condition of the rectum No doub itself ma rm bacillary origin, but the primary th be tub is advisable, following the openi i scess, a examination of the r sing suspicion of a tuber nt sh and the chest X-ray u cin

In tropical surgical practice it is necessary to exercise considerable care in examining an ischiorectal abscess In the majority of cases the diagnosis is not difficult, but in view of the much greater frequency of genito-urinary infections in both male and female patients it is necessary to be quite sure that in male patients the abscess is not coming from a Cowper's gland infection or in a female patient from a Bartholin's gland infection The number of patients seeking treatment at hospital for fistula-in ano is very much greater than those seen suffering from ischiorectal abscess The reason for this is that a high proportion of the patients suffering from ischiorectal abscess allow the abscess to burst at home before coming to hospital Patients in the tropics tend to seek treatment at a late stage,

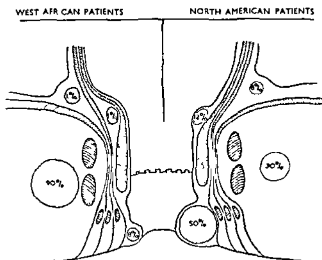


FIG 71
Diagram showing ischiorectal abscesses Frequencies compared African and American

they may live a long way from the hospital and household remedies are persisted in, in spite of much pain, so long as the patient's general condition does not appear to deteriorate markedly

Almost 100 per cent of cases of ischiorectal abscess are due to direct spread of infection from the anorectal area of the intestinal tract This conclusion can scarcely be doubted in view of the fact that more than 90 per cent are followed by a fistula-in ano The line of infection from the rectum to the ischiorectal fossa is almost certainly via the anal pits, which start above the pectinate line and proceed through various gaps in the sphincteric system

There is no advantage gained in leaving an ischiorectal abscess to accumulate a large quantity of pus before it is opened The rule should be, as with a whitlow, that if the patient loses a night's sleep because of the local pain of the condition the abscess should be opened and drainage should be instituted If the abscess is not drained at an early stage it may produce many secondary pockets of pus, making the condition more difficult to drain In almost all cases of ischiorectal

potential source of danger They exist in both male and female patients If inflammation occurs within these minute pockets there is a marked tendency for the terminal end to rupture as the pressure within them rises This is somewhat similar to what occurs in the case of the vermiform appendix, where the entrance to the appendix becomes blocked during an attack of inflammation, a "blind loop" type of obstruction thus being brought about These blind pits may be several millimetres long and run downwards within the wall of the anal canal They are placed deep to the skin lining When the small deep abscess fills the cavity in which it is contained it must burst either into the anal canal, precipitating the formation of an anal fissure, or into the deep tissues between the individual portions of the external anal sphincter muscle and so into the ischiorectal fossa where a large abscess is formed

Eisenhammer [5] lays stress on the occurrence of an abscess of anorectal origin between the internal and external anal sphincter muscles If not relieved surgically it bursts either above into the rectum, below in the para-anal position or laterally into the ischiorectal fossa He recommends that before these complications arise it should be opened as an intra anal procedure, making an incision over the maximum swelling present The incision cuts through part of the internal sphincter, but this is not unduly damaging if undertaken carefully This type of abscess has been encountered on a few occasions, but it probably occurs fairly commonly as a precursor of an ischiorectal abscess The intra-anal approach to the condition is an interesting innovation to the subject and might be used with advantage if cases are seen before the ischiorectal fossa is infected An abscess in this position can be recognised by the presence of a soft swelling just above the levator ani shelf It causes pain and a sense of throbbing in the anal area, there is malaise and fever present and defæcation is very painful The position of the abscess is usually the posterior anal segment

Various tracks have been described to indicate the line and direction along which the inflammation spreads in forming an ischiorectal abscess and subsequently a fistula-in ano The internal anal sphincter is formed by hypertrophy of the circular fibres of the internal muscle coat of the rectum below the base of the ampulla of the rectum This sphincter is placed in the upper half of the anal canal *The external sphincter is made up of three rings of muscle The upper* and lower rings are complete, while the middle ring is formed by a strap-like band of muscle which runs round the front of the anal canal and having its two ends attached posteriorly to the anterior surface of the coccyx On careful digital examination of the anal canal it can be detected that there is a slightly weak area placed posteriorly This area corresponds to the place where, in the middle third, the strap like muscle leaves the anal canal passing back to the coccyx

Whether there is one or more fistulous openings in the buttocks there is invariably only one opening into the anal canal at the inner end of the track

As far as has been observed all fistulæ seem to enter the anal canal in a direct line from the fistula opening externally to the anal centre The original track of a fistula in-ano is always single Multiple tracks occur only where the condition is neglected, and if inflammation is of a low-grade character the external opening may open and close intermittently If the fistula closes temporarily, it may open

than chloromycetin. Once an ischiorectal abscess has formed it will not resolve as a result of the use of antibiotic drugs alone, it needs to be opened and drained. A patient should be informed that the drainage of an ischiorectal abscess is very likely to be followed by a fistula-in-ano. If he is not aware of this, he will be disappointed when it is subsequently intimated to him that a second operation is needed at a later date to get rid of the residual discharge.

FISTULA-IN-ANO

Fistula-in-ano is the term used for a fæcal fistula which runs between the lower end of the rectum or anal canal and the skin of the buttocks adjacent to the anal orifice. There is a general tendency throughout the body for inflammatory conditions to develop in areas proximal to any form of obstructive mechanism. The obstruction may be truly pathological or a slight overactivity of a normal physiological system. Evidence of pre-obstructive inflammatory changes is most apparent where the obstruction is partial but of a definite organic nature. This is well illustrated by the known sequence of changes which occur behind urethral stricture: defective blood supply, inflammation, abscess formation and ultimately a urinary fistula. Changes of a less apparent but quite definite nature occur proximal to any sphincteric mechanism which develops a state of slight hypertension. If the tension of the sphincter is quite normal, pre-sphincteric changes seldom occur. It has been noted personally that the anal sphincteric tension in male patients between the ages of 15 and 45 years is in most cases very much higher than that noted in female patients between these ages. It is well known that certain conditions affecting the intestinal tract are very much more common in male patients than female patients. This applies to the anorectal inflammatory conditions which are seen almost exclusively in the male wards. The same applies to cases of volvulus and intussusception.

Evidence of pre-sphincteric inflammation can be noted in the lower end of the œsophagus, the pylorus of the stomach and the rectum: it can also be found in other systems. The frequency with which inflammation of the upper urinary tract follows obstructive spasms of the lower end of the ureter is well known. Emphasis is seldom, if ever, laid on the possibility of abnormally high sphincteric tension of the anorectal sphincter mechanism being a factor in the production of ischiorectal abscess and subsequent fistula in-ano formation. In view of the observed higher sphincteric tension in this area in a high proportion of male patients as compared to that found in female patients, and the very much higher incidence of inflammatory anorectal disease in males, this factor may reasonably be given consideration. Anorectal pathology has long been recognised as a cause of anal sphincteric spasm but there is quite a possibility, in fact a high probability, that an abnormally high anal sphincteric tension may be a strong predisposing factor in the production of anorectal inflammatory conditions.

Another factor which is important in the production of these conditions is the presence of the congenital anal pits situated at the base of the sinuses of Morgagni, which are formed from the remains of the proctodeal membrane. These multiple blind pits, which are deeper posteriorly than anteriorly, are a

In investigating the track of a fistula-in-ano the easiest method to use is the insertion of a bent metal probe along the track, from the skin opening into the anal canal The probe is bent into the shape of a minute male urethral sound Using a well-oiled probe of this shape it can, by appropriate rotation, be made to enter almost any sinuous track It usually ultimately enters the anal canal without much difficulty In a small proportion of cases it goes through the track of the fistula and abuts on the skin lining of the anal canal where it can easily be felt by a finger inserted into it It is usually not difficult to push it through an already small perforation in this position or through an obviously weak area to which it is easily directed

The immediate opening into the anal canal may be temporarily closed in a small proportion of the cases Some workers prefer to identify the position of the internal opening of the fistula before using a probe or in a case where the attempted introduction of an instrument is not successful The most suitable solution to use for this purpose is hydrogen peroxide to which methylene blue is added This solution is injected with a syringe, no needle being used The nozzle of the syringe enters the external opening of the fistula and the solution is pushed in slowly A rectal speculum is inserted into the anal canal in the position opposite to that in which the internal fistulous opening may be expected The body temperature is sufficient to make the hydrogen peroxide give off bubbles of oxygen and so bubbles enter the anal canal if the track is open The position of the fistula opening in the anal canal can be seen easily, due to the methylene-blue colour present It is helpful if an assistant injects the solution from the syringe so that the operator's hands are free to examine the internal opening, if necessary using a bent probe and swabs The injection of lipiodol followed by the use of X-ray photography may demonstrate the track into the anal canal, but this method is not particularly useful The difficulty is not in making a diagnosis of fistula-in-ano but the finding of the internal opening in the anal canal

Most patients if asked will admit that flatus passes through the fistula track and that they are conscious of bubbles of gas coming out from the external opening constantly The discharge from a fistula is much more profuse if a patient has diarrhœa or takes a saline aperient As with fæcal fistulæ elsewhere, the diagnosis of fistula-in-ano can be confirmed if necessary by the patient taking one or two teaspoonfuls of charcoal powder in water to drink and following this a saline aperient Minute charcoal particles can be found in the fistulous discharge *within forty-eight hours*

Other discharging openings in the para-anal or perineal areas may give rise to difficulty in diagnosis The opening resulting from an ischiorectal abscess which has come through the levator ani muscle from the supralevator space may give rise to some difficulty in diagnosis *If the abscess is not truly of rectal origin*, the opening which it gives rise to is not truly a fistula but a sinus, technically speaking, as no other skin or mucous membrane surface is involved These abscesses are better drained as adequately as possible and packed so that they fill up *from their base*

A fistula may on rare occasions be found to contain a foreign body Fish bones have been observed on occasions

again at another position some months later, and in this way a branching track is formed The line of the track of a fistula in ano has been found in about 90 per cent of the cases to run from the external opening across part of the ischiorectal fossa and between the middle and lower third of the external anal sphincter muscle The track then proceeds slightly upwards, below the level of the lowermost fibres of the internal anal sphincter It enters the anal canal usually somewhere in its posterior half but seldom if ever in the middle line Fig 72 indicates the disposition of the sphincter muscles as described by Morgan and Hughes[6]

Inflammatory areas about the lower parts of the buttocks adjacent to fistula-in ano tracks correspond to branching ramifications of the original track present

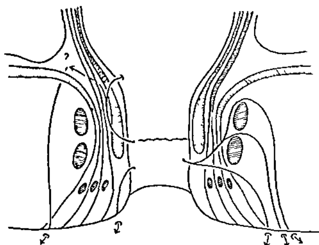


Fig 72
Diagram showing tracks of fistula in ano possible routes

These areas should be excised with the fistula at operation This decreases the the risk of recurrence About 8 per cent of cases of fistula-in-ano show a small opening about one-third of an inch away from the anal verge The track in these cases runs between the lower part of the anal canal out to the skin but below the lower third of the external anal sphincter muscle A further 2 per cent of the tracks run adjacent to the upper third of the external anal sphincter In the remaining 90 per cent of the cases the track runs between the middle and lower third portions of the external sphincter The track therefore in the majority of cases runs between the middle and lowermost part of the external sphincter muscle

A pelvirectal abscess, which is placed below the pelvic peritoneum and above the levator ani muscle, may or may not be of rectal origin, it may be due to a blood borne infection It is not usually possible in this form of abscess to demonstrate any opening into the rectum The abscess ultimately perforates the levator ani muscle and so enters the ischiorectal fossa, but it may not necessarily be of rectal origin

completely below the internal sphincter, it is possible to insert a probe along the track and bring the end out through the anus. With the bent probe acting as a retractor, the complete track can be excised without undue detriment to the sphincter mechanism, the lower third of the external sphincter only being cut in one position in this operation. The track must be excised, as it contains epithelium which grows into it from the anal canal and from the external skin surface: it may be completely epithelialised in chronic cases. Unless the epithelium is completely removed a recurrence will take place, it is therefore best excised completely. It is not possible to curette out the epithelium completely



FIG. 73
Fistula-in-ano with probe in track before excision

with an instrument. It is surprising how small the final scar is, following excision of a large mass of local tissue for the eradication of ramifying tracks in these cases.

Where there is a branching system of tracks present it is necessary to excise a large triangular skin area which includes all the fistulous tracks and the localised inflammation. The apex of the triangle excised reaches the anal canal and corresponds to the position of entry of the fistula to the anal canal. The base of the triangle is at right-angles to the line of the fistula. If a small single track is excised completely the area can be closed loosely with sutures. If it is necessary to remove a large triangular area to eradicate a large branching track, it is better not to use skin sutures but to pack the area only following excision (Figs. 73 and 74).

Healing takes about four weeks where a large area of tissue is removed. Following the removal of a small fistula, healing takes about three weeks if the area is left open to granulate, but if the area is closed with sutures primary union

A patient with a discharging fistula from the para-anal position may volunteer the information that water comes from the opening when he passes water. In these cases a urinary fistula is invariably the diagnosis of the condition. The opening from the urethra being via a Cowper's gland abscess cavity. The abscess ruptures into the soft tissues of the perineum and may reach a position close to the anus.

A para anal sinus may be due to a tuberculous condition of the pelvic bones. An osteomyelitis of the ischium on rare occasions causes some difficulty in diagnosis. In these cases it is usually quite obvious that there is some form of bone disease present. In a high proportion of the cases there is interference with the movement of the hip joint. An X-ray photograph is helpful in these cases if the apparatus is available. If not available, and the diagnosis is uncertain, the use of a probe passed into the opening usually leads to the site of the disease. Bare bone may be palpated and this has a characteristic feeling when touched with a probe. Any track which proceeds more than an inch laterally from the external opening seldom comes from the rectum.

Cases have been seen many years ago, though not recently, of lymphogranuloma inguinale giving rise to very extensive subcutaneous tracks about the perineum, the buttocks and down the back of the thighs for up to 10 in. in length. In such cases the complete "saddle area" was extensively infiltrated and penetrated by chronic epithelialised tracks. One case was observed in a male patient with rectal involvement, which is unusual though seen occasionally. Lymphogranuloma inguinale should be kept in mind as a rare cause of anal fistula formation in the tropics.

An inflamed pilonidal sinus may occasionally give rise to difficulty in diagnosis. In this condition, which is seen more frequently in warm climates than in cold areas of the world, there is a skin irregularity close to the tip of the coccyx. From this area there is an epithelialised track which runs upwards in most cases over the back of the sacrum. On rare occasions the track may run downwards and the end of it come to the para-anal position.

A distally disposed pilonidal sinus track may give rise to considerable difficulty in diagnosis. This condition has been seen exclusively in European and Middle East patients in the tropics but not on any occasion in members of the local population. An attack of inflammation in a pilonidal sinus is very much predisposed to by excessive sweating induced by prolonged sitting while driving a car long distances under tropical conditions.

The treatment of fistula-in-ano is most important. The condition is one *which very frequently calls for treatment in male patients but is comparatively* rare in female patients in the tropics. It is essential to undertake one operation and cure the condition. Any form of treatment which does not produce complete cure by one operation should be considered unsatisfactory and abandoned. Opening and scraping of the track of a fistula-in-ano is an unsatisfactory method of dealing with the condition. The recurrence rate by this method is not less than 30 per cent., which is poor. Nothing less than complete excision of the fistulous track is adequate. As 90 per cent. of the cases have a track running between the middle and lower thirds of the external anal sphincter muscle and

number of such cases now occurring in temperate climates is decreasing to a very low level because of the improved position regarding tuberculosis generally Tuberculosis remains a serious disease in the large towns in the tropics and the disease is very widespread, much more so than many authorities are willing to admit These tuberculous fistulæ are liable to be seen in the tropics for many years to come This condition must therefore be kept in mind when dealing with fistulæ about the anal area Many of the more recently qualified doctors have probably never seen cases of this sort where tuberculosis is present as a basic cause of the condition In tuberculous cases it is usually possible to find a large area of tuberculous granulation tissue in the upper part of the anal canal The surface has a peculiar slippery feeling as the granulations have a characteristic slimy discharge from their surface If the condition is suspected, a piece of granulation tissue should be removed for section Tubercle bacilli can almost invariably be found in the tissue removed

It is advisable to give a three weeks' course of streptomycin sulphate to the patient before attempting excision of a tuberculous fistula Excision is probably the best procedure but should not be undertaken until the condition has been considerably improved by streptomycin It is necessary to examine the patient's general condition very fully considering the possibility of tuberculosis at other sites

If lymphogranuloma inguinale is suspected as being the cause of a fistulous track about the perianal area a preliminary course of chloromycetin should be given before any operative treatment is undertaken This is a rare cause of fistula-in-ano, but still occurs in some tropical areas It is becoming much less common since the introduction of the sulpha group of drugs and the tetracycline antibiotic preparations

Patients are always very grateful for operative treatment undertaken for the cure of fistula-in-ano The operative risk is very low, carrying a mortality rate of not more than 1 per cent Low spinal anæsthesia is very suitable for operations of this nature

CARCINOMA OF THE RECTUM

In considering the process of disease either of two classifications may be adopted, the anatomical or the pathological In the anatomical all forms of pathology are considered relative to certain anatomical areas With the pathological classification a certain disease process is considered and this is applied to each of the areas where it is found Each method has its advantages and disadvantages—neither is entirely satisfactory Many of the surgical specialties have been planned on a regional anatomical basis It is, however, necessary to have a wide appreciation of general pathology when endeavouring to identify any pathological process which may affect a fixed anatomical area

In discussing the subject of Sigmoidoscopy and its Findings in Chapter 7, the special features of various conditions affecting the rectum and sigmoid colon were considered at sufficient length to indicate the conditions which might reasonably be looked for when a patient in the tropics complains of symptoms referable to the lower colon and rectum Carcinoma of the rectum was mentioned in considering the pathological appearances as seen on proctoscopic examination

may occur and the wound be closed in ten days A patient need not necessarily stay in hospital until the wound is healed completely Patients are usually pleased to return to their own home when healing is progressing satisfactorily

If it is found that the fistulous track penetrates the anal sphincter in a high position either between the middle and upper third or above the upper third of the muscle, it would be unduly damaging to the external sphincter muscle to cut it completely from above downwards Fortunately these high tracks account for only a small proportion of the cases seen, not more than 2 per cent In these cases it has been found satisfactory to insert a probe along the track and bring it out through the anal canal, a finger is then inserted into the anal canal so

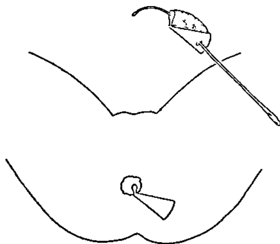


FIG 74

Diagram showing fistula in ano excised on probe

that the mucous membrane can be felt at the position where the probe enters the canal The track is then excised from the outside right up to the level of the lining of the anal canal and cut off, at that position This has been undertaken on several occasions without any subsequent evidence of recurrence The gap between the upper and the middle third of the external anal sphincter muscle may become quite large where a fistula is present and so it is not difficult to approach the lumen of the anal canal from the ischiorectal fossa aspect The tissues are steadied by the finger in the anal canal The wound caused by excision of these deeply situated fistulæ should be packed, no effort being made to close it The area closes by granulation tissue and epithelialises over within a few weeks The ultimate scar is quite small It is helpful before operating on any case of fistula in ano to give the patient a course of sulphaguanidine This decreases the risk of spreading coliform infection in the ischiorectal fossa following operation

A small number of cases of fistula in ano are of tuberculous origin The

Surgeons working in Europe do not always fully appreciate the close resemblance between some of the tropical conditions and malignant disease The importance of a preliminary biopsy in dealing with cases in the tropics cannot be overstressed Whereas stool examinations may detect some of the tropical diseases, a biopsy of pathological rectal tissue is still essential A patient may have malignant disease of the rectum and a tropical rectal condition in addition

Rectal ulceration may be due to amœbiasis, schistosomiasis, tuberculosis, *lymphogranuloma inguinale*, bacterial colitis, or be the result of irritant corrosives introduced into the rectum with an enema, in addition to malignant disease

Benign polypi of the rectum are seldom seen in patients in the tropics apart from schistosomiasis Non-malignant tumours of the wall of the rectum are rare, but may occur Any tissue in the area can give rise to non-malignant tumour formation Non-malignant tumours from the elements of the wall of the rectum do not usually give rise to ulceration No cases of syphilitic ulceration of the rectum have been noted in West Africa In very few parts of the tropical world are there facilities available, other than in the large towns, for carrying out tissue section examinations

Following removal of any tumour mass, a lapse of not less than two weeks is probable before a report is received indicating the nature of the pathology in the specimen removed Under these circumstances it is considered permissible, in fact desirable, where amœbiasis is thought to be a possible cause of the condition under consideration, to give the patient a course of emetine and note the result during the next fourteen days, while waiting for the pathology report of a biopsy specimen The improvement in amœbic cases is very spectacular after one week where a course of emetine is given No cases of myocarditis have been noted after the use of emetine

In the case of carcinoma of the rectum it is not usually possible at the first clinical examination to estimate accurately whether or not the disease has spread beyond the walls of the intestinal tract into the lymphatic system The rate of growth of malignant disease of the rectum varies greatly If the rectum is fixed to surrounding structures more firmly than might be considered within the normal physiological limits, it is likely that the disease has extended beyond the wall of the rectum Any ulcerating surface in the intestinal tract gives rise to septic absorption and some enlargement of the local lymphatic glands Some glandular enlargement does not necessarily indicate that there is malignant involvement present It is noted in cases of gastric ulceration that there is usually associated lymphatic gland involvement *Malignant disease may be suspected, but following* partial gastrectomy and microscopy of the ulcer removed with associated glands, no malignant changes are noted in either sites presumably the lymphatic gland enlargement is of infective origin

The rectum may become attached to the back of the bladder in male patients as the carcinoma progresses In female patients the upper third of the vagina becomes involved in advanced cases If these changes occur the outlook is poor

Whereas in a European patient a colostomy opening may be reluctantly accepted as being the only possible alternative to a normal anal orifice following abdominoperineal resection of the rectum for malignant disease, the majority of

The one tropical condition which may give rise to serious difficulty in diagnosis because of its close similarity in appearance to carcinoma of the rectum is amœboma, due to *Entamœba histolytica* In this condition there is usually a large, hard, indurated mass with an ulcerated surface extending over an extensive area of rectal wall There is considerable induration of the rectum beyond the limits of the ulcerated mass Whereas the area corresponding to the edges of the ulcer are hard and indurated, they are not unduly raised as seen in malignant cases The sense of thickening and infiltration of the rectal wall "gradually" gets less, there is also a gradual diminution in the hardness, whereas in carcinoma cases the edge which is definitely hard and "raised" changes rather abruptly from the hard feeling to the normal mucous membrane texture

Although a colloid carcinoma producing a lot of mucus from its surface may give rise to a hæmorrhagic mucous discharge, this is not nearly so profuse as that found in the case of amœboma With an amœboma there may be, in addition, minute and very painful ulcers about the para-anal area which is soiled by the discharge coming in contact with it In the case of carcinoma, when the finger examining the condition goes over the raised edge of the mass, there is a sense of slight cavitation inside the growing edge This thinning of the centre of the ulcer inside the main edge does not occur in amœbic cases The floor of an amœboma is more uniformly flat than that found in the case of carcinoma If a carcinoma is growing rapidly it may be associated with a feeling of softness and thickness, whereas if the growth is of a lower grade, schirrous type, there is marked fibrosis and the whole condition is rather harder in character Differentiation between the amœboma and carcinoma is made by examination of the mucous discharge for vegetative forms of amœbæ or the cysts and microscopy of tissue removed If a carcinoma is confirmed by biopsy it is necessary to decide what is the most suitable form of treatment in the individual case being dealt with

At the present stage of medical science the most hopeful treatment of carcinoma of the rectum is early complete excision of the diseased area It is absolutely essential in surgery in the tropics to undertake a biopsy in any case of suspected sigmoidorectal carcinoma before radical excision is undertaken If this is not done, errors will occasionally be made and cases submitted to operation which should be treated for an amœbic condition or schistosomiasis and not malignancy Fortunately amœboma is not a very common condition, but this makes the error of mistaken diagnosis all the more likely to occur The necessity for caution has been emphasised by the fact that a limited number of cases have been invalided from tropical areas of the world to Europe where they have had an abdominoperineal excision of the rectum undertaken in the belief that malignant disease was being dealt with, but the diagnosis was not confirmed by microscopic section of biopsy tissue prior to laparotomy, the true diagnosis of an amœbic condition being made only after the abdominal resection had been performed This major error is predisposed to by lack of caution on the part of the doctor working in the tropics Experience should have indicated the necessity of excluding the presence of tropical diseases of a non-malignant nature before referring the case for radical surgery

necessary to mobilise the rectum very extensively in the pelvis to make the reversing possible When the lower bowel is reversed and withdrawn the carcinoma will be seen on the exposed mucous membrane surface The gut withdrawn is now well washed Two to three inches away from the anal margin, depending on the position of the growth, the rectum is cut across through half the circumference of its lumen Bleeding is arrested This opening allows the closed descending colon to be brought down from above through the pelvis and anal sphincter and out into the opening made in the reversed rectum The descending colon itself is now opened some distance from the closed end through half the circumference of its lumen Both tubes are still held with slight retraction from below The semicircle of cut rectum and the semicircle of cut descending colon are now joined securely When the half-circle of each tube is firmly sutured together and held with the long ends of the ligatures in artery forceps, the other half of the tubes can be sectioned The second two halves are united in a similar manner The long ligature ends are then cut short The anastomosis so formed is allowed to return back through the anal sphincter At this stage the operator's rubber gloves should be changed and under good illumination the inside of the pelvis is again inspected If necessary a few more sutures may be inserted to safeguard the junction already formed The pelvic peritoneum is then reconstructed and a large-sized rubber rectal tube is put through the anal sphincter by an assistant and threaded into the descending colon The rectal tube is held in position by an external suture placed close to the anal margin This tube allows of the escape of flatus from above so that no tension is exerted on the junction during healing The tube should be left in position for not less than five days The patient is given a course of streptomycin following the operation This decreases the risk of pelvic cellulitis

This type of resection of the rectum has been criticised on the grounds that the anal canal and sphincters being retained, the total field of lymphatic involvement by malignant growths may be inadequately removed In only 5 per cent of cases of carcinoma of the rectum is there a downward spread of infection in the lymphatics Following the operation in male patients there may be sexual impotence due to interference with the second and third sacral nerves which pass across the walls of the rectum *This second criticism is not a very adverse one,* as the same danger accompanies the abdominal perineal operation In view of the gravity of the condition for which the operation is undertaken, this disadvantage is also of secondary importance

The two great advantages of the conservative resection of the rectum, retaining the anal sphincters, are that normal bowel control is retained, which, certainly to African patients, is an enormous advantage, and the absence of an ill-controlled artificial anus It is not a practical proposition supplying colostomy bags in a hot climate They become offensive very quickly and also deteriorate rapidly Those held in position by adhesives cause skin irritation in hot climates Conservative resection of the rectum via the pelvis alone is a dangerous procedure because of the risk of fæcal leakage and the difficulty of managing the clamps The insertion of an even line of sutures is also not easy The rectal "pull through method," with the anastomosis undertaken outside the abdomen, is a distinct

patients in the tropics decline to accept this procedure If a colostomy opening is undertaken contrary to their expectations they usually demand its closure before they are willing to leave hospital A difficult situation then arises Patients may refuse operation rather than agree to an artificial anus if it is indicated to them beforehand that there is no possible alternative consistent with removing the disease completely

Carcinoma of the rectum seems to occur less frequently in patients in the tropics than in patients in temperate climates When malignant disease of the rectum does occur it is often of a lower grade malignancy than that seen in Europe This is most important Under these circumstances the most suitable method of getting over the difficulty of the artificial anus, which is unacceptable in most cases, is to undertake a resection of the rectum with conservation of the sphincter muscle This is usually possible if the anal canal is not involved by the growth It has the great advantage that normal intestinal control and normal bowel action are conserved, following removal of the rectal growth, and has the obvious disadvantage that growths low down in the rectum cannot be removed completely It is, however, a technique which should be appreciated and understood by all surgeons working in the tropics Mention of the procedure has already been made in considering resection of the aganglionic portion of the rectum in cases of Hirschsprung's disease in children (see Fig 63, No 3)

Carcinoma of the rectum seldom gives rise to marked intestinal obstruction and in these circumstances it is usually quite practical to undertake a one-stage resection rather than a two-stage operation with a preliminary colostomy as may be necessary in cases of carcinoma in other positions of the colon If the tumour is present high up in the rectum, as noted on proctoscopic examination, the case is usually suitable for resection with conservation of the anal sphincter Gilchrist and David,[7] concluding their very comprehensive article on the subject of malignant disease of the rectum, write "I would suggest that a tempered ambition to save the rectal sphincter as well as to cure the cancer is a praiseworthy objective in suitable cases of the upper rectal ampulla and most, if not all, removable cancers of the rectosigmoid "

Following preliminary cleansing of the bowel by a colon lavage and a course of sulphaguanidine, a laparotomy is undertaken The extent of the disease is estimated when the abdomen is opened and the extent of glandular involvement considered The pelvic peritoneum is divided so that the full length of the rectum can be exposed and isolated laterally and behind Strong intestinal clamps are applied above the level of the growth The bowel is then divided and closed above and below and clamps removed The level at which the section is made is decided upon after consideration of the lymphatic drainage which may possibly be involved In early cases a few inches above the growth is all that need be removed, but in later cases more is necessary so that a sufficient area of lymphatics is taken away to remove the disease completely

The rectum, after section and complete closure, is invaginated into its own lumen after the manner of an intussusception It is pulled through the anal sphincter as if pulling a sleeve inside out A strong forceps is applied from below through the anus to withdraw the lower bowel through the sphincter It is

not necessarily occur In these cases it is advisable to make an initial opening not more than 1 cm in length This deals satisfactorily with the immediate obstruction If a larger incision is made, an unduly large amount of subcutaneous areolar tissue is cut and this predisposes to subsequent fibrous tissue formation When a comparatively small opening only is made there is a minimal amount of fibrosis produced, gradual stretching subsequently occurs spontaneously as the bowels move constantly This principle is very important as it is the presence of pathological fibrosis in the subcutaneous or submucous position which is the basis of stricture formation

No cases have ever been seen where an infant born with slight narrowing of the rectum at the upper end of the anal canal ever required active surgical treat ment to rectify this condition Children may be born with a defective rectum and an abnormal anal canal, the communication between the rectum and the surface being narrow and opening at an abnormal position These cases may be classed as imperforate anus with fistula formation, they constitute one form of rectal stricture In these cases the bowel can evacuate gas freely, and fluid motions possibly with some difficulty In view of the low residue nature of milk diet taken in early infancy the baby may maintain reasonable health for many months in spite of the abnormality being present

The fistulous track usually runs a fairly straight course and it is seldom difficult in most cases to introduce a well lubricated straight urethral sound through the fistulous track dilating it slightly There is a natural reluctance to undertake any form of major operation on a tiny infant during the early months of life unless there is a reasonable chance of a successful outcome with a low operative risk The method of gradual dilatation in this form of congenital rectal stricture has therefore been adopted in these cases The possibility that these cases might be greatly improved by the use of sex hormones combined with dilatation is suggested by the following interesting observation A female patient, aged about 15 years, came for examination because she had not seen any menstrual periods at any time Her breasts had already started to develop On examination it was found that there was no vaginal canal apparent at all An operation was undertaken in the hope that the cervix might be reached on opening the soft tissues, for it was apparent on rectal examination that a uterus was present This operation was undertaken and the cervix was reached in the depths of soft tissue and a uterine sound was passed into the cervical canal which was open A skin graft was applied on a moulded applicator to the track opened in the hope of producing a vaginal canal *Unfortunately very little of the skin graft took, but the patient ultimately* healed by skin growing along the track formed and held open by the applicator, which was worn for three months She was ultimately left with a narrow vagina which was fully epithelialised, but this was surrounded by marked fibrosis Normal menstrual periods occurred a few months later Periodic vaginal dilatations were undertaken under pentothal anæsthesia during the next two years The vagina admitted one finger only with some difficulty At the age of 17 the patient became pregnant and the interesting observation was made that with development of the pregnancy there was quite an astonishing increase in the calibre of the vagina, which changed from the adherent thin skinned narrow-tube type with adherent

advantage The results of this operation are very satisfactory in a high proportion of the cases of patients in the tropics, where the grade of malignancy of the rectum is comparatively low and where there is such a marked resentment to the production of an artificial anus following an abdominal perineal resection of the rectum which is the alternative procedure

STRICTURE FORMATION

In temperate climates stricture of the rectum is almost invariably due to active malignant disease in adult patients A very small number of cases are due to the late results of ulcerative colitis Cases are sometimes seen due to narrowing of the upper end of the anal canal in newborn infants, this form of abnormality represents a slight defect in recession of the remains of the original proctodeal membrane A few cases are seen following operations on the anal canal All other forms of rectal stricture are rare occurrences The situation is quite different in tropical countries Congenital abnormalities of the lower rectum in cases of imperforate anus in infants, with or without associated fistula, are much more commonly seen Stricture formation secondary to carcinoma of the rectum is less common in the tropics than in temperate areas Parasitic rectal infection due to Schistosoma and *Entamœba histolytica* may, on rare occasions, give rise to rectal narrowing, though localised stricture formation with these conditions is more likely to occur in areas of the colon proximal to the rectum

From practical experience it can be said that without doubt stricture of the rectum as seen in West Africa is caused most frequently by lymphogranuloma inguinale This may or may not be the case in other parts of the tropical world Rectal stricture formation due to this condition is more common in women than in men, this is due to the distribution of the lymphatic system of the anogenital areas Rectal stricture due to lymphogranuloma inguinale is seen occasionally also in male patients Stricture of the rectum may be seen in female patients following prolonged obstructed labour In many of these cases there is an associated vesico-vaginal fistula also present, due to a pressure necrosis by the obstructed fœtal head

Corrosive ulceration of the rectum following the use of irritant enemata gives rise, on occasions, to extensive ulceration of the rectum and sigmoid areas of the colon, with perirectal fibrosis and stricture formation Many inches of the lower bowel may be involved This is a most serious condition

Post-operative anal fibrosis, with stricture formation, is frequently seen where an excess of mucous membrane has been removed following the excision of extensive hæmorrhoids Anal fibrosis is usually not excessive following excision of fistula-in-ano, as only a very small area of anal canal lining is removed, the same applies to anal fissure, where a limited excision is undertaken

It is necessary now to consider in more detail the individual conditions giving rise to rectal strictures The methods of treatment are dependent on several factors If an infant is born with a completely imperforate anus and it is found that there is a thin skin membrane bulging at the presumed anal position, this may be opened in the anteroposterior direction, and stricture formation does

The method of submucous resection of hæmorrhoids is advocated for this very reason, as the minimum of mucous membrane is removed and the least possible damage inflicted on the submucous areolar tissue space

Dilatation of the anal canal following hæmorrhoidectomy should not be necessary if the operation is undertaken correctly If dilatation of the anal canal has to be undertaken it is painful to the patient and may have to be continued for a prolonged time In cases where a strong adherent scar is present in the perianal area at the position of the anal verge and within the anal canal, it is probably better to excise it and skin-graft the area, as recommended by Hughes,[3] who undertakes the procedure following the removal of large hæmorrhoids and also in cases of fistula-in-ano Few workers, however, consider that a skin graft to the anal canal is necessary as a routine procedure and reserve the technique for special cases only The procedure has a limited use in certain cases A Thiersch graft is removed from the leg and sutured in position under a roll of gauze A high proportion of the grafts take if the bowel is well cleaned before operation and sulphaguanidine has been given to lower the coliform content and there is adequate hæmostasis before the graft is applied

Another type of rectal stricture which is not uncommonly seen in the tropics is that found in cases following obstructed labour As a result of pressure of the baby's head on the posterior aspect of the vagina and anterior aspect of the rectum an area of necrosis develops In some of the cases a rectovaginal fistula develops in others the rectum is damaged but does not give way An area of ulceration occurs within the bowel and on healing there is a band of scar tissue in the lower third of the rectum in the anterior half of its lumen This partial stricture formation does not give rise to bowel obstruction, as it involves only the anterior half of the rectal circumference The calibre of the rectum at this part is sufficiently large to allow the passage of stools without undue difficulty Any attempt to deal with this area of fibrosis might give rise to a rectovaginal fistula and caution must be exercised The condition is probably best left alone A similar type of partial stricture may occur in the same position due to ulceration of the adjacent upper third of the vagina, following the use of irritant vaginal tampons These partial rectal strictures are similarly better left alone

Pathological strictures of the rectum constitute a large group All inflammatory and neoplastic conditions associated with ulceration may give rise to fibrosis and stricture formation Schistosomiasis and amœbiasis seldom cause gross obstruction in the rectum itself they give rise to a more generalised inflammatory condition rather than a localised stricture Malignant disease of the rectum has not been seen very frequently in West Africa though it occurs on occasions Some consideration has already been given to the treatment of this condition

Much the most important cause of stricture formation of the rectum seen in tropical countries is that due to lymphogranuloma inguinale This subject is a difficult problem on which there is very little information available in journals of surgery or venereology Some personal observations will therefore be given Rectal stricture due to this condition is seen in both male and female patients, though it is much more common in females In this section the matter of rectal stricture only is being dealt with and further details regarding the nature of this

walls to the lax adult type, freely mobile within the pelvis The change from the pre pregnant condition of the vagina to the state which was found during the latter months of pregnancy was no doubt due to the physiological effects of the hormones of pregnancy The beneficial result of the pregnancy could never have been achieved by any possible surgical means The patient was transferred to the maternity section of the hospital and ceased to be under my care Unfortunately my personal records do not state whether a normal delivery took place or if a Cæsarean section was necessary for the delivery of the baby, but at the time the patient was transferred to the maternity unit it seemed as though there was a very reasonable chance of a normal delivery

In view of this remarkable case, where undoubtedly the pregnancy greatly improved the condition for which the patient initially sought surgical treatment, it seems that the advantage gained by the normal hormones of pregnancy might reasonably be gained by the use of artificial pregnancy hormones in other conditions where there is stricture formation of tubular structures within the pelvis The softening of pelvic tissues during pregnancy is a normal physiological provision of Nature designed to facilitate the birth of a child The effect in this case was very spectacular and quite unexpected, but the information gained might be used to advantage in other conditions No cases of imperforate anus with fistula formation were seen in West Africa subsequent to the time this pregnancy case was seen and so the use of hormones has not been tried in any cases of rectal stricture formation, but the observation might be kept in mind with advantage and used later The case was so remarkable that it is considered worth mentioning

Stricture of the anal canal following the removal of large hæmorrhoids is seen from time to time The majority of surgeons appreciate the necessity of conserving as much mucous membrane as possible when the piles are being removed The majority of patients suffer no complications following the removal of piles They are invariably much benefited following the operation Occasionally, however, the hæmorrhoids may be very large and the posterior masses may coalesce, making it difficult to remove the main masses while leaving a band of anal skin between them In this type, where there is a temptation to remove an excess of anal skin or mucous membrane, great care must be exercised If an excess of tissue is removed and no band of mucous membrane is left between the two major pile masses, an anal stricture is almost bound to follow If the operation is properly undertaken it should not be necessary to use any rectal dilators following the procedure Fig 71 shows a diagram of the anal canal as depicted by Parks following careful dissection and microscopic examination of sections of the wall of the anal canal Some of the features are slightly exaggerated in order to lay emphasis on the important features which have a marked bearing on various anorectal pathological conditions It will be seen that there is an areolar tissue space deep to the lining of the anal canal This is presumably present to permit of the expansion of the lumen of the canal during the passage of stools This "potential space," as it may be termed, is of great importance, as without it, it would not be possible for the anal canal to dilate adequately as required This is precisely what happens when the space is obliterated by an indiscriminate excision of a mass of hæmorrhoids, where the hæmorrhoid and the mucous membrane are tied off *en masse*

The method of submucous resection of hæmorrhoids is advocated for this very reason, as the minimum of mucous membrane *is removed and the least possible* damage inflicted on the submucous areolar tissue space

Dilatation of the anal canal following hæmorrhoidectomy should not be necessary if the operation is undertaken correctly If dilatation of the anal canal has to be undertaken it is painful to the patient and may have to be continued for a prolonged time In cases where a strong adherent scar is present in the perianal area at the position of the anal verge and within the anal canal, it is probably better to excise it and skin-graft the area, as recommended by Hughes,[3] who undertakes the procedure following the removal of large hæmorrhoids and also in cases of fistula in-ano Few workers, however, consider that a skin graft to the anal canal is necessary as a routine procedure and reserve the technique for special cases only The procedure has a limited use in certain cases A Thiersch graft is removed from the leg and sutured in position under a roll of gauze A high proportion of the grafts take if the bowel is well cleaned before operation and sulphaguanidine has been given to lower the coliform content and there is adequate hæmostasis before the graft is applied

Another type of rectal stricture which is not uncommonly seen in the tropics is that found in cases following obstructed labour As a result of pressure of the baby's head on the posterior aspect of the vagina and anterior aspect of the rectum an area of necrosis develops In some of the cases a rectovaginal fistula develops in others the rectum is damaged but does not give way An area of ulceration occurs within the bowel and on healing there is a band of scar tissue in the lower third of the rectum in the anterior half of its lumen This partial stricture formation does not give rise to bowel obstruction, as it involves only the anterior half of the rectal circumference The calibre of the rectum at this part is sufficiently large to allow the passage of stools without undue difficulty Any attempt to deal with this area of fibrosis might give rise to a rectovaginal fistula and caution must be exercised The condition is probably best left alone A similar type of partial stricture may occur in the same position due to ulceration of the adjacent upper third of the vagina, following the use of irritant vaginal tampons These partial rectal strictures are similarly better left alone

Pathological strictures of the rectum constitute a large group All inflammatory and neoplastic conditions associated with ulceration may give rise to fibrosis and stricture formation Schistosomiasis and amœbiasis seldom cause [illegible] se to a more generalised inflam- [illegible] Malignant disease of the rectum [illegible] though it occurs on occasions Some consideration has already been given to the treatment of this condition

Much the most important cause of stricture formation of the rectum seen in tropical countries is that due to *lymphogranuloma inguinale* This subject *is* a difficult problem on which there is very little information available in journals of surgery or venereology Some personal observations will therefore be given Rectal stricture due to this condition is seen in both male and female patients, though it is much more common in females In this section the matter of rectal stricture only is being dealt with and further details regarding the nature of this

disease will be considered in a later chapter Here it will be considered with reference to female patients, as it is the more commonly seen The disease is said to be due to a filterable virus, and if the condition is suspected by the clinical appearances of active or healed anogenital ulceration, it can be confirmed in about 80 per cent of the cases by the Frei-Hoffmann skin test In this reaction an extract of the material removed from a bubo, due to this disease in males, is suitably prepared and sterilised and on injection intradermally a marked hyperæmic skin patch develops within twenty-four to forty-eight hours in positive cases The antigen can be purchased under the trade name of "Lygranum," made by Squibbs Laboratories The patient, usually a young adult female, comes to hospital complaining of any condition or symptom referable to the anogenital area hæmorrhoids, a discharge, or leaking water may be described In very few stations are the reagents available for undertaking the Frei-Hoffmann test for this condition It is therefore necessary to rely on some clinical observation to make the diagnosis

Having seen a large number of these cases over more than twenty years, it is suggested that the most reliable clinical sign of this condition is the finding of "bridges of skin" about the vulva If a careful examination is undertaken, using a probe angled at the top, it will be found that this sign is positive in almost 100 per cent of the cases and there are very few false positives This is much higher than can be detected by the Frei-Hoffmann test it is therefore most useful

Perforations of the lesser labia with the formation of "bridges of skin" are very typical Cases can be seen in patients during and after the active stage of the disease has passed off It is at this stage that patients usually come to hospital There is frequently, in this condition, a marked atrophy of the anal sphincter muscles and the patient may become completely incontinent of fæces There is not infrequently a fæcal discharge present as a result of rectal incontinence There may be no evidence of any sphincteric action about the anal area The position of the rectal stricture is usually about 1½ in from the estimated position of the anus The stricture is made up of very hard fibrous tissue covered by fairly adherent thin anal skin The lower surface of the stricture, which can be seen, is not covered by mucous membrane but by a prolongation of the skin of the anal canal which is thought to grow upwards over the initially ulcerated area round the anal canal The opening in the stricture is usually centrally placed At the time the patient comes for advice complaining of constipation, the central opening is usually not large enough to admit one finger In many of these cases there is a rectovaginal fistula below the stricture

It is very unwise to undertake any form of reparative operation on cases of lymphogranuloma inguinale until a preliminary course of one of the antibiotic drugs of the tetracycline group has been administered These drugs are more effective in treatment for the condition than the sulpha drugs which were used at an earlier stage before antibiotics were available Tetracycline antibiotic drugs are very effective in treatment, but if any form of surgery is undertaken without a preliminary course of treatment, the area operated upon is very liable to break down and the condition be made much worse than before the surgery was attempted

The absence of an effective anal sphincter does not necessarily mean that a patient is totally incontinent of fæces, but in a patient where the sphincters are defective or absent, to remove the obstructing effect of the shelf-like stricture completely may greatly aggravate the patient's discomfort This is particularly so when motions are fluid during an attack of enteritis or following an aperient The stricture of the rectum associated with lymphogranuloma inguinale is of a well localised type and does not extend over a wide area The central edge is narrow and its lateral part is usually not more than 1 cm in thickness If an attempt is made to remove a shelf-like circle of tissue corresponding to the stricture, the patient's condition is ultimately made worse

Some of the textbooks on venereology suggest the excision of the stricture without giving any details It would appear that this advice is given by those who have never undertaken the procedure In order to relieve the patient's constipation and partial obstruction, without taking away the beneficial effect of the shelf of tissue formed by the stricture, the following method can be adopted A narrow V-like excision is undertaken (Fig 75) at four positions on the stricture, the position of removal of the four pieces of tissue is represented by the 12, 3, 6 and 9 positions on a clock, as applied to the under surface of the stricture with the patient examined in the lithotomy position A fine diathermy needle should be used for the excisions in order to avoid severe bleeding The use of a scalpel is more dangerous because of the risk of hæmorrhage which may follow the cutting of hard fibrous tissue with a non contractile base By the removal of four triangular pieces of tissue with the bases on the edge of the opening in the stricture, and the apex at the outer part of the stricture, the length of the new edge forming the opening in the stricture is approximately doubled, while the thick lateral part of the stricture is interfered with very little There is by this means no further tendency for the outer part of the stricture to contract and the opening is made larger with the minimal removal of tissue As the new star like opening tends to contract, the adjacent sides of the adjoining triangles tend to get slightly shorter In so doing they tend to increase the opening in the stricture rather than close it, and this is what is required, while the outer circle of the stricture is not reduced The stricture is usually sufficiently hard to prevent the edges of the different sections joining together at the positions where the triangles were excised Considerable improvement is achieved by this method in relieving the constipation with the minimum risk of producing complete incontinence of motions

If wedge excisions in the stricture are not undertaken the other alternative is to pass rectal dilators This method has been used on several early occasions The dilators split the stricture, but the torn edges are liable to reunite, whereas by the diathermy method a permanent division of the stricture is produced with the removal of the minimum of tissue It is necessary to give the patient an anæsthetic to pass the rectal dilators, as it is otherwise very painful The passage of rectal dilators is not usually followed by undue hæmorrhage Patients have been encouraged to use rectal dilators themselves but generally are unable to do this efficiently because of the discomfort caused

The use of pregnancy hormones as an adjuvant to other forms of treatment, dilatations or wedge excisions has not been tried personally, but the possible

disease will be considered in a later chapter Here it will be considered with reference to female patients, as it is the more commonly seen The disease is said to be due to a filterable virus, and if the condition is suspected by the clinical appearances of active or healed anogenital ulceration, it can be confirmed in about 80 per cent of the cases by the Frei-Hoffmann skin test In this reaction an extract of the material removed from a bubo, due to this disease in males, is suitably prepared and sterilised and on injection intradermally a marked hyperæmic skin patch develops within twenty-four to forty eight hours in positive cases The antigen can be purchased under the trade name of "Lygranum," made by Squibbs Laboratories The patient, usually a young adult female, comes to hospital complaining of any condition or symptom referable to the anogenital area hæmorrhoids, a discharge, or leaking water may be described In very few stations are the reagents available for undertaking the Frei-Hoffmann test for this condition It is therefore necessary to rely on some clinical observation to make the diagnosis

Having seen a large number of these cases over more than twenty years, it is suggested that the most reliable clinical sign of this condition is the finding of "bridges of skin" about the vulva If a careful examination is undertaken, using a probe angled at the top, it will be found that this sign is positive in almost 100 per cent of the cases and there are very few false positives This is much higher than can be detected by the Frei-Hoffmann test it is therefore most useful

Perforations of the lesser labia with the formation of "bridges of skin" are very typical Cases can be seen in patients during and after the active stage of the disease has passed off It is at this stage that patients usually come to hospital There is frequently, in this condition, a marked atrophy of the anal sphincter muscles and the patient may become completely incontinent of fæces There is not infrequently a fæcal discharge present as a result of rectal incontinence There may be no evidence of any sphincteric action about the anal area The position of the rectal stricture is usually about 1½ in from the estimated position of the anus The stricture is made up of very hard fibrous tissue covered by fairly adherent thin anal skin The lower surface of the stricture, which can be seen, is not covered by mucous membrane but by a prolongation of the skin of the anal canal which is thought to grow upwards over the initially ulcerated area round the anal canal The opening in the stricture is usually centrally placed At the time the patient comes for advice complaining of constipation, the central opening is usually not large enough to admit one finger In many of these cases there is a rectovaginal fistula below the stricture

It is very unwise to undertake any form of reparative operation on cases of lymphogranuloma inguinale until a preliminary course of one of the antibiotic drugs of the tetracycline group has been administered These drugs are more effective in treatment for the condition than the sulpha drugs which were used at an earlier stage before antibiotics were available Tetracycline antibiotic drugs are very effective in treatment, but if any form of surgery is undertaken without a preliminary course of treatment, the area operated upon is very liable to break down and the condition be made much worse than before the surgery was attempted

granulating tissue involving the whole lumen of the bowel with multiple small jelly-like cystic spots present on it These correspond to the retention cysts present produced by the deep mucous membrane crypts of the bowel This condition gives rise to a very serious form of stricture extending over several inches of the rectosigmoid area of the gut There is no possibility of dilating it In one case where this was seen the patient developed subacute intestinal obstruction and it became a matter of urgency to relieve this state of affairs A local excision was attempted from within the pelvis and lower abdomen but the anastomosis leaked and the patient ultimately died No doubt the junction was undertaken using an unhealthy part of the bowel which predisposed to the failure of union at the site of the anastomosis In that case the lower rectum did not appear to be seriously damaged, and on considering the case later, it is thought that the correct procedure should have been to undertake a pull-through sleeve anastomosis outside the abdomen following resection of the involved part and closure of the residual healthy ends A preliminary colostomy in these cases would no doubt get over the immediate difficulty, but a final decision would have to be taken at a later time following the relief of the immediate obstruction A preliminary colostomy would be the wisest procedure if in a small country station there were inadequate facilities to undertake the full resection Following the colostomy the patient could be transferred to a main centre for the resection Any form of rectal stricture is an extremely serious condition Each case calls for skilled care and attention

RECTAL PROLAPSE

Prolapse of the rectum is seen most frequently in two distinct age groups of patients Young children between the ages of 1 and 4 years are commonly affected, and adult patients over the age of 40 The condition is seen much less frequently between the ages of these two groups

There are three obvious degrees of rectal prolapse which are easy to recognise (Fig 76) Mucous membrane alone prolapses in the early cases In the more advanced cases there is a prolapse of the mucous membrane, with, in addition, the walls of the lower two-thirds of the rectum—that is, the part below the peritoneal cavity The rectum descends from 2 to 4 in in second-degree cases In the third group the rectum eventrates to a sufficient extent to have contained within the mass a pocket of the peritoneal cavity which may contain loops of the small intestine Where mucous membrane alone prolapses, the mucous membrane is felt as two thin layers between the fingers This form of prolapse seldom exceeds 1 in in length If the walls of the rectum come down through the anal sphincter there is a heavy mass of rectal tissue palpable The tubular prolapsed mass may be up to about 2 in in diameter as seen from below In these cases the opening into the bowel is centrally placed This point is important, as it differentiates the second degree of prolapse from cases of third-degree prolapse, where the opening into the bowel is placed on the posterior aspect of the mass In the third type there is not only a prolapse of the rectum but virtually a hernia of the peritoneal cavity protruding through the anal sphincter The anal sphincter must essentially be very patulous in these cases

beneficial effect of the softening which they produce in pelvic tissue generally is worth considering Pregnancy hormones are unfortunately rather expensive Most of these patients are sterile as a result of the chronic pelvic infection and none of them has been noted to become pregnant during the time they were under observation and treatment

The one further condition which has been noted in the tropics as a cause of extensive stricture formation of the rectosigmoid area is that following corrosive

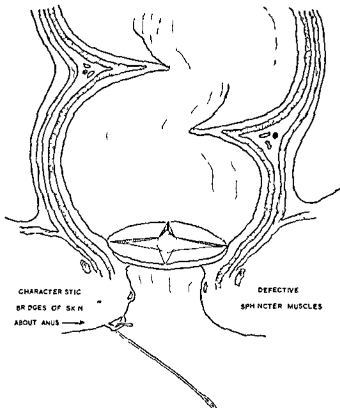


Fig 75
Diagram indicating method of excision of lymphogranuloma stricture of rectum

burning as a result of a native enema Patients do not usually volunteer the information that an enema has been administered at home unless they are questioned on this matter The irritant nature of the materials used in preparing the enema is such that extensive sloughing of the entire mucous membrane of the rectum and sigmoid may be produced A brown or black necrotic slough may be noted when it separates from the rectum After separation there is an extensive raw granulating area which extends over several inches of the rectum and sigmoid colon If the rectum is examined with a sigmoidoscope at this stage after the sloughs have separated, it will be seen that there is a bright red surface of raw

this reason *diarrhœa is a much greater predisposing* cause in the production of rectal prolapse than constipation The condition is seen more frequently during the rainy season in the tropics than during the dry season, this is largely due to the increase in the fly breeding during the rains and the rise in the incidence of enteritis associated with fly-borne infection of food

A second or third degree prolapse of the rectum cannot occur unless there is a marked relaxation in the tone of the anal sphincter, this is very important, as it permits of the stretching of the anal skin In infants and adults in old age there is a lesser degree of angulation of the anal canal with the rectum proper than in patients in the adolescent and younger adult age groups The rectum is more *vertically disposed This may predispose to some extent to rectal prolapse* In adult male patients the condition is seen almost exclusively in those over the age of 40 years In this section of the male population there is a higher incidence of urethral obstruction than in younger men Fibrous urethral stricture and prostatic hypertrophy account for most of the cases of urinary obstruction Chronic bronchitis may also be a contributory *factor, particularly whooping*-cough or measles bronchitis in young children and chronic bronchitis in old patients In spite of the frequent pelvic floor damage in female patients following childbirth, prolapse of the rectum is seen less frequently in women than in men

Patients admitted to hospital for the treatment of prolapse of the rectum should initially be given a large dose of sedative medicine appropriate to their age and weight whether they be infants or adults It is unwise to attempt the immediate reduction of a rectal prolapse when the patient is first seen in the out-patient department Without strong sedatives, unnecessary pain may be caused by attempting reduction of the condition Successful reduction is much less likely to occur if the patient is hurt by the manipulation If reduction is successful, but pain is inflicted in achieving this, the prolapse is very likely to be pushed out again almost immediately following reduction An hour or two resting in bed under adequate sedation before attempting reduction is an advantage If a patient comes to hospital late in the evening, the prolapse should not be left unreduced until the morning Much the best position to place the patient when undertaking the reduction is the "knee-chest" attitude In this way there is a natural tendency for the rectum to be withdrawn into the pelvis when the hanging mass is elevated Rubber gloves should be used and pressure so applied with *moist swabs to the apex of the prolapse* that the lateral walls are "rolled in" to the lumen of the prolapse By this method success can be achieved in about 90 per cent *of the cases without undue difficulty, and without employing an* anæsthetic Sedatives by mouth alone are sufficient The rectal prolapse should be "rolled in" rather than any attempt made to push it in *en masse*

Reduction must start at the apex and continue in that way, as the central tube of rectum is withdrawn into the pelvis by gravity induced by the position of the patient When the reduction is complete the buttocks should be approximated and held together while the patient is helped to roll over on to his side from the knee-chest position to the later position on the bed Once the patient is lying on the bed he can straighten his legs A firm bandage should then be placed right round the pelvis It is an advantage to raise the foot of the

The intra-abdominal pressure, associated with straining, is exerted at the anterior aspect of the rectum and so the anterior wall is forcibly pushed through the front half of the anal ring As the peritoneal protrusion descends, a sac of peritoneum containing the small bowel enters this anterior part of the anal sphincter while the posterior part of the rectum follows after the manner of a "sliding hernia," through the anal sphincter Because the anterior peritoneal sac contains loops of ileum, the anterior mass becomes much larger than the posterior and so the lumen of the prolapsed rectum points in the posterior direction The presence of small intestine, containing gas, placed in the anterior aspect of the mass gives rise to a resonant note on percussion of the anterior aspect of the prolapsed mass The small intestine caught in this anal hernia may cause vomiting

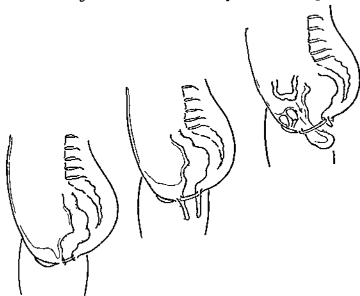


Fig 76
Diagram showing three degrees of prolapse of the rectum

The most important predisposing factors in the production of rectal prolapse are a loss of fat from the ischiorectal fossa, a loss of tone in the musculature of the pelvic floor and an attack of diarrhœa in the case of children Prolapse of the rectum is associated more frequently in children with diarrhœa than constipation In adult male patients, straining secondary to urinary obstruction is a marked contributory factor These three conditions predisposing to rectal prolapse may all occur with any form of chronic illness Most cases of infantile rectal prolapse seen in the tropics are found in infants suffering from malnutrition and chronic malaria The children are in poor general condition With loss of weight, for any reason, there is a decrease of fat in the ischiorectal fossa The pelvic floor made up principally of the levator ani muscle descends Children suffering from chronic diarrhœa lose excess fluids and become dehydrated There is a marked hypotonia due to a disturbance of the salts in the blood, chiefly sodium and potassium For

applied in a linear manner at three or four positions of the anal canal equally distant apart Davy's wire rectal speculum is useful in separating the walls of the canal while the cautery is being applied An actual cautery can be used if diathermy is not available If this form of wire speculum is not available a nasal speculum can be used quite satisfactorily The line of cautery can be applied at the positions between the blades

Fixation of the reduced mucous membrane can be achieved by injecting any of the well-known sclerosing fluids used for the injection of varicose veins Small quantities of these substances are injected into the submucous areolar space with the child under an anæsthetic 5 per cent phenol in almond oil, sodium morrhuate or quinine and urethane can be used In severe cases of large rectal prolapse which recurs repeatedly, reduction under an anæsthetic followed by pararectal injection of 1 to 2 c c of absolute alcohol into the area of the hollow of the sacrum, on each side, has been advocated, but this method has not been used personally

In infants, examination of the para-anal skin for threadworm ova should be undertaken The rectal irritation due to threadworms may be a precipitating factor in causing straining and so produce the rectal prolapse in a child in poor general condition In adults the rectum should be examined some days after reduction of the prolapse to exclude the small possibility of a rectal carcinoma being present, or other pathological condition which may give rise to a sense of fullness in the rectum and a constant desire to evacuate the rectum forcefully If in adults rectal prolapse is present, the case should be investigated to exclude the possibility of urethral obstruction being the basic cause of the straining which has caused the prolapse If urethral obstruction is found, it should be dealt with immediately as an emergency Where a prolapse of the mucous membrane only is detected it can be treated by excision of three areas of mucous membrane, leaving between these the intervening areas so that a stricture does not occur Fine catgut sutures should be inserted in the mucous membrane edges which remain following the removal of the excess tissue The removal of the three areas of mucous membrane suggested makes the redundancy of the intervening areas much less If the complete prolapse is simply excised and sutured, it would undoubtedly predispose to an anal canal stricture The method of pararectal packing after reduction of the prolapse has been advocated Each ischiorectal fossa is opened and an opening made through the levator ani muscle This method is not recommended, having been tried on a few occasions many years ago It gives rise to two deep infected wounds and the patient suffers much pain during the healing process There is little doubt that a lot of pararectal fibrosis occurs following the operation and this is the object of the procedure, but it would appear to be an operation lacking in precision

Various operations have been advocated after the nature of rectopexy, using strips of fascia lata, these have also been tried on occasions and the results have been good The strips of fascia are inserted between the pararectal tissue at the level of the reflection of the peritoneum of the anterior surface of the rectum and along the side walls and put through the peritoneum and into the cellular tissues close to the brim of the pelvis The operation is undertaken with the

bed on high blocks to decrease the risk of immediate recurrence The patient often sleeps after the reduction He should be instructed not to exert any abdominal pressure during the process of reduction or immediately after it is complete The local œdema associated with the prolapse subsides after reduction

A prolapsed rectum seldom becomes gangrenous, as it occurs only through a very lax sphincter muscle Veins on the surface of the prolapse may bleed and this is aggravated if the bowel is handled roughly during attempted reduction Cases are often seen at a very late stage in the tropics, the prolapse having existed for several days There is sometimes ulceration of the surface of the bowel present when the case is first seen It is desirable in these cases to wash the outside of the prolapse and apply a mild antiseptic lotion, such as boric solution, before attempting reduction On rare occasions it is necessary to give an anæsthetic to the patient before reduction can be achieved The disadvantage of general anæsthesia is the liability of the patient to struggle on waking and so precipitate a recurrence of the condition No advantage is gained if this happens In adult patients it is therefore an advantage to give a low spinal anæsthetic rather than general anæsthesia Babies seldom need an anæsthetic for the reduction of a rectal prolapse If a strong sedative is given and the baby is allowed to have a breast feed with the mother sitting at the side of the bed, reduction of the prolapse is usually not very difficult

In spite of the general teaching regarding the treatment of prolapse of the rectum in infants and the various methods advocated to cure this condition, it has been found necessary on very few occasions to operate on babies for prolapse of the rectum They almost invariably get well without any form of operative treatment being undertaken It is essential to treat the underlying cause of the precipitating factors—malnutrition, chronic malaria and enteritis Chronic malaria is a very important factor in the production of chronic illness in infants in the tropics Sulphaguanidine is useful in the treatment of enteritis Babies gain weight if the essential disease is treated and they are given groundnut oil with their food It can be disguised with various foods which the child may like, adding it to milk feeds or soft foods of any sort used in the local diets As marked hypotonia is produced by a deficiency of sodium and potassium in the blood, ample fluid containing these substances should be given by mouth It is rarely necessary to give intravenous fluids If the baby is given any form of injection, the prolapse of the rectum may recur following reduction due to straining as a result of the discomfort caused by the injection Medicines by mouth are most suitable in these cases

The more active surgical methods of treatment of young children which may occasionally be needed consist in reduction followed by linear cauterisation of the mucous membrane of the anal canal and lower rectum or local perianal sclerosis It is necessary to give a general anæsthetic for this form of treatment The treatment works in two ways The cautery burns causing some pain produce anal sphincter spasm, comparable to that produced in cases of anal fissure, and this is an advantage There is also a submucous inflammation produced beneath the position of the burning and this causes an adhesion of the rectal mucous membrane or skin lining of the anal canal to the deep tissues The cautery is

With the advent of antibiotic drugs this is one of the operations which has again been revived and with considerable success Several cases of severe prolapse of the rectum have been operated upon personally in this way and the results have been very satisfactory regarding the cure of the prolapse It has been possible to control sepsis by the use of antibiotics The use of solid silver wire, however, has been found, in a fair proportion of the cases, to give rise to a marked sense of discomfort some months later at the position of the twisted ends, which are placed not far away from the tip of the coccyx In some instances the wire had to be removed at a later date Fortunately no recurrence of the rectal prolapse was seen in any case following the removal of the wire A marked improvement in the use of solid silver wire for the purpose of confining a prolapsing rectum is the use of "braided silver wire", this is fine wire which is formed into the configuration of a minute plaited tube mesh If this braided wire is used, a knot can be made with it in the same way as when knotting any other ligature material This braided wire can be inserted with a half-circle *cutting needle The resultant ends of the cut off material, after the knot is made,* are flexible and do not form rigid points and so do not hurt the patient This material is a great improvement on solid silver wire

Pursuing this matter further, it will be found that an even better result is obtained if instead of using braided silver wire a length of floss nylon is used This type of nylon material is used for the repair of inguinal hernia, and is made up of a very large number of strands of nylon of almost spider-web thickness placed loosely together in a long wisp This material, which is prepared ready for use, is very strong It is almost, if not completely, non irritant in the tissues It holds a knot easily and firmly, and being soft does not give rise to a sense of a foreign material in the tissues The material is very strong and does not stretch It conforms in every way to the requirements necessary for the operation of anal ring restriction Great care is needed in undertaking this operation, so that strict aseptic conditions are preserved *The bowel should be adequately* prepared beforehand, using sulphaguanidine or sulfasuxidine for some days before the operation is undertaken, and good skin preparation is essential *Following the operation a course of streptomycin should be given* Fig 77 shows the method used to introduce the wire, or floss nylon, using two wide-bore exploring needles They are introduced through a small post-anal incision and worked round the semicircle of each side of the anus and brought out through an anterior incision in front of the anus The incisions allow of the burying of the ligature material after the needles are removed and the ligature is tied An assistant putting a thumb in the anal canal facilitates making the ring of wire or floss nylon the correct size A half-circle needle can be used for insertion of the wire or floss nylon if preferred

Apart from the operative procedure for the cure of rectal prolapse it is obviously desirable *to consider the patient's general health* with a view to improving his state of nutrition, the tone of his muscles and his general physical and mental wellbeing Any form of tropical disease producing chronic ill health should be attended to and treated Suitable diet should be ordered to encourage a gain in body weight If there has been urinary obstruction which precipitated

patient in the Trendelenburg position In any form of operation of this type there is some risk of damaging large pelvic veins, care must be exercised to avoid these and also the ureters on either side Ripstein [8] has recommended the subperitoneal insertion of a sheet of fascia lata round the rectum—this fascial sheet is 2 in wide by 4 in long The upper 3 in is divided longitudinally, allowing of one piece being brought round each side of the rectum and then sutured to the cellular tissue in the hollow of the sacrum This method has not been used personally This fascial sheet is inserted deep to the pelvic peritoneum After placing it in position and fixing it with sutures the pelvic peritoneum is again closed over it Good results are reported, using this method In no case has rectosigmoidectomy been used for the cure of a third-degree prolapse of the rectum This method is advocated and used extensively by those undertaking rectal surgery exclusively

In cases where there is a large rectal prolapse of the intra-anal sliding hernia type, there must obviously be a gross defect in the pelvic floor to admit of such a prolapse of the viscera through the anal sphincter In these cases good results may be obtained following reduction by a systematic repair of the pelvic floor The most important area for repair is that anterior to the anal canal, in the position of the puborectalis portion of the levator ani muscle In view of the many different methods advocated from time to time for the treatment of this condition in adults, it is obvious that there is no uniformity of opinion as to the most suitable procedure to be adopted In order to deal with this form of major prolapse, as seen in tropical areas of the world, where facilities and assistance is limited, it is necessary to recommend some simple and efficient operation which can be undertaken with success by those with average surgical skill It must ensure a high proportion of cures with the minimal operative risk For this purpose there is little doubt that the " anal ring restriction " method is excellent

Considering this operation as it was first introduced takes us back about a hundred years to the days of Thiersch, whose name is associated with skin grafting He introduced a simple operation which was based on the observation that major rectal prolapse can occur only if there is an abnormal expansion of the anal skin area In order to curtail this expansion, Thiersch used a piece of silver wire inserted subcutaneously round the anal canal It was placed in the position adjacent to the lower section of the external sphincter muscle and fixed as a ring by twisting the ends posteriorly A finger was inserted into the rectum as a gauge to measure the required size of the ring while tightening the wire and fixing the ends by rotation After twisting the ends of the wire the cut off points were buried in the deep tissues between the coccyx and the anus By this means the anal canal was maintained at a sufficient size to permit of the bowels acting normally yet of sufficiently small size to prevent prolapse of the rectum This operation gave very good results in a proportion of the cases so treated but sepsis tended to occur soon after the operation, or in some cases after many months The wire ultimately ulcerated out or had to be removed The operation was ultimately abandoned because of the risk of sepsis The operation would have been a permanent success had it been possible to control the sepsis associated with it

the condition, it is necessary to indicate to the patient the necessity of having continued treatment, on a fixed plan, so that a recurrence of the urinary condition does not again give rise to further difficulty. Patients treated for urinary obstruction often do not appreciate the liability of a recurrence of their condition and neglect treatment, not because of an unwillingness to have treatment, but because it was not made clear to them that the condition needs treatment for a prolonged time. Mild laxative medicines are a help in facilitating easy bowel action, and this is desirable in the case of patients who have suffered from a serious disturbance of normal physiology. In a small number of cases where a massive rectal prolapse occurs a rectosigmoidectomy may have to be considered.

REFERENCES

1 BAKER, R. L. (1957). Treatment of condyloma acuminatum. *Obstet. and Gynec.* 10, 611.
2 WEINBERG, M. H. (1956). Risks and dangers of antibiotic therapy. *Indian Practit.* 9, 667.
3 HUGHES, E. S. R. (1953). Primary skin grafting in proctological surgery. *Brit. J. Surg.* 41, 639.
4 ALLEN, A. G., HARKINS, H. N., MOYER, C. A. & RHOADS, J. E. (1958). *Surgery—Principles and Practice*, p. 969. London: Pitman Medical.
5 EISENHAMMER, S. (1958). A new approach to the ano-rectal fistulous abscess based on the high inter muscular lesion. *Surg. Gynec. Obstet.* 106, 595.
6 MORGAN, C. N. & HUGHES, E. S. R. (1952). Primary skin graft following excision of fistula in-ano. *Aust. N.Z. J. Surg.* 21, 212.
7 GILCHRIST, R. K. & DAVID, V. C. (1947). A consideration of pathological factors in radical resection of the rectum for carcinoma. *Ann. Surg.* 126, 421.
8 PIPSTEIN, C. B. (1952). Treatment of massive rectal prolapse. *Amer. J. Surg.* 83, 68.

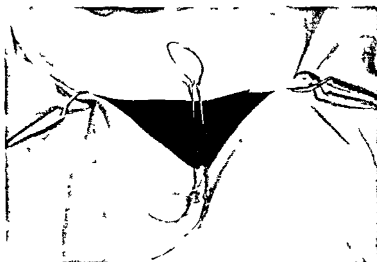


FIG 77
Wire ring operation (Thiersch) for rectal prolapse



FIG 78
Gauging size of anal orifice before knotting the wire

site for each type of parasite *Schistosoma hæmatobium* tends to be located principally within the blood-vessels associated with the lower urinary tract, the rectum is affected by this parasite to a lesser extent *S mansoni* is found largely in the vessels of the inferior mesenteric system and so the sigmoid-rectum is most often implicated Other parts of the large bowel may also be infected With *S japonica* the blood-vessels of the small intestine are initially infected most heavily, but later the large intestine becomes involved The liver is also infected The ova are found in stool specimens on examination in a high proportion of the cases The ova are extruded through the walls of the structures which represent their principal location The fact that the characteristically shaped ova are found with comparative ease in urine and stool specimens of patients who are heavily infected with these diseases has greatly detracted from the appreciation of the importance of clinical conditions as they affect metastatic positions from which places the ova cannot be recovered easily

Schistosome worms in their primary sites are found largely within the blood-vessels, but when they are found in a secondary distant site they are found usually not in the blood-vessels but in the extravascular position In this latter respect the schistosomes resemble more closely the other trematode infections In order to illustrate the relationship between the schistosomes and the other trematodes, an extract is appended at the end of the chapter which gives a better perspective of the relative position of the various trematode infections which may be encountered in the tropics Man is only one of a very large number of primary hosts affected with trematode worms There is little doubt that this group of diseases *is still very inadequately described in the medical textbooks and practically* not at all in surgical textbooks In the past ten years there has been a great increase in the appreciation of the importance of various worm infections of the *central nervous system Diaconita and Nagy* [1] *describe cases of raised intracranial* pressure due to trematode infection of the brain Other instances of involvement of the central nervous system by helminth infections have already been referred to earlier

It is ill appreciated that the ultimate death-rate due to schistosomiasis is about 4 per cent of all patients who suffer from schistosomiasis at any time, one in every twenty-five patients This figure represents an enormous number of deaths in countries where up to 30 per cent of the population is infected The patients ultimately die of the complications of the disease which follow the chronic inflammatory secondary changes in various sites Edington [2] found that the cause of death in schistosomiasis cases was almost invariably due to secondary infection with back pressure and obstruction in the upper urinary tract In a certain proportion of the cases, liver, bladder and heart complications also account for some of the deaths In view of the risk of surgical complications, it is considered that schistosomiasis cases are better treated throughout under surgical supervision In a high proportion of cases of carcinoma of the bladder in the tropics there is an associated schistosomiasis *infection of the bladder* present It is necessary to undertake a cystoscopic examination in any case of urinary schistosomiasis where progress in treatment is considered not entirely satisfactory or where there is *continued bladder pain for more than four weeks*

9

Schistosomiasis

THE NATURE OF THE DISEASE

SCHISTOSOMIASIS is the name applied to a group of diseases which form a subsection of the classification Trematodosis or the diseases due to flatworms In all the trematode diseases there is a primary and a secondary host the primary host carries the mature adult parasites, while the secondary host acts as a reservoir for the developing embryonic forms Man is only one of the numerous hosts which may become infected with schistosomiasis Many animals and even birds are affected with schistosomes The secondary hosts are usually members of the snail family With the allied trematode conditions such as the paragonimiasis or lung flukes, the intermediate host is a member of the crab family, and with *Clonorchis sinensis*, fish act as the secondary host Whereas the embryonic parasite or cercariæ of the schistosome diseases usually swim freely in water and so contact man and animals, thus infecting them, the paragonimiasis infections almost invariably are contracted by eating uncooked crab Clonorchiasis, another trematode infection, is spread by the ingestion of uncooked fish Eating of uncooked fish is not uncommon in the Far East The mature ova of the various schistosome parasites have characteristic appearances which are well known They are passed by the primary host and on hatching out in water, the miracidium form infects the secondary host The secondary host ultimately sheds the developing embryonic parasite as the cercariæ form and this infects man Eradication of the disease is a major public health problem in countries where these conditions are endemic It is necessary to break the cycle at some point, either by treating all infected persons efficiently, or removing the secondary hosts Both methods are attempted

The three well-known schistosome diseases are schistosomiasis hæmatobium, schistosomiasis mansoni and schistosomiasis japonica These trematode diseases have been separated from the other trematode diseases on the basis of the morphology of the parasites concerned and not on any good clinical grounds This is unfortunate in some ways as it tends to isolate the schistosome diseases unduly from the other members of the trematode group This predisposes to a lack of appreciation of the fluke diseases other than schistosomiasis The special character which distinguishes the schistosomes from the other trematodes is that they are diœcious in character—that is to say, the male and the female worms are separate organisms With the other members of the trematode group there is one organism only which is hermaphrodite in type, carrying both male and female reproductive organs in the same organism Schistosome worms are located initially within the blood-vessels of certain areas of the body Whereas the distribution of each group may be widespread, there is a characteristic primary

of the world in an effort to infect man voluntarily with schistosome cercariæ of types not found in man in clinical practice The cercariæ penetrate the skin and cause a severe dermatitis, but the parasite does not mature and so the infection is not maintained The dermatitis produced experimentally is the same sort as that which occurs with the three types of schistosomiasis so well known in man The dermatitis with schistosomiasis of the *S hæmatobium*, *S mansoni* and *S japonica* seems to be milder than that produced experimentally with the cercariæ of types which do not progress and to which man may be considered resistant The excessive skin reaction is possibly the determining factor in preventing the maturing of the schistosomes Dermatitis due to schistosome cercariæ of birds is well known in Canada, where persons bathing in some of the Great Lakes get this form of dermatitis not infrequently The condition is also known in Germany and France, and recently it has been described in Japan My first contact with schistosomiasis was as a house physician, in 1932, when interest was created in this subject by Matheson [5] describing many cases of dermatitis following swimming in a municipal swimming pool in the Cardiff area of Wales The infection was traced to a cercaria from the schistosomes associated with ducks Salome [6] reported cases of dermatitis due to schistosome cercarial infection in the Netherlands in 1955 The condition is well known in that part of the world in general practice The infection was reproduced experimentally in volunteers to prove the identity of the causative agent

The distribution of the various types of schistosomiasis affecting man is not difficult to remember Parts of South America and the Caribbean area are infected with *S mansoni*, Puerto Rico is particularly heavily infected *S mansoni* alone seems to occur in that part of the world *S japonica* occurs probably exclusively in the Far East The condition, as the name implies, occurs in Japan and is also found in Korea The eastern half of China is heavily infected and the infection spreads west up the Yangtse Kiang River The western parts of China other than the Yangtse river valley are little affected The Philippine Islands have certain areas where the infestation rate is very high The World Health Organisation estimated that there were not less than 300,000 cases in the Philippines in 1952 The disease constitutes a major Public Health problem in that part of the world *S japonica* is also found in parts of Indonesia

Africa is infected quite heavily with *S hæmatobium* and *S mansoni* in almost all parts The dry desert area is the only part where the condition is not seen and this is because of the low rainfall which is inadequate to maintain the snails, and the population is also particularly sparse This applies to the Sahara in the upper half of the Continent and the Kalahari Desert in the south-west Egypt is particularly heavily infected with schistosomiasis Parts of Southern Europe and the Middle East are infected The type found is largely *S hæmatobium* Slow-flowing rivers with wide valleys and much irrigation in the area predispose to the increase of infection The incidence of the disease varies very greatly from place to place even in closely adjacent districts The types of snail carrying the infection, as secondary hosts, are very numerous and constitute a study in themselves Snail identification is not the immediate concern of the surgeon, even though important

after the cessation of treatment It is seldom possible to examine all patients cystoscopically following treatment in tropical hospitals though this may be the ideal where staff and facilities permit Liver and spleen changes associated with fibrosis give rise to much pathology which can ultimately be attributed to schistosomiasis Chronic appendicitis, salpingitis and cholecystitis are sometimes due to this condition also

In any abdominal case of a subacute or chronic type in the tropics, where the cause of the symptoms complained of are not initially apparent, the presence of schistosomiasis should be looked for and considered The symptoms may be very variable It is of particular importance to keep the condition in mind when pathology in the upper urinary tract is suspected Cases of low grade chronic diarrhœa need to be investigated for all forms of schistosomiasis—schistosomiasis hæmatobium and schistosomiasis mansoni being important in Africa while schistosomiasis japonica is important in the Far East Schistosomiasis, as seen in South America and the Caribbean area, is almost exclusively of the schistosomiasis mansoni type

The schistosome diseases are perpetuated largely because they do not usually give rise to very acute symptoms in the early stages in indigenous patients in the tropics In Europeans the signs and symptoms are much more acute Burtner [3] indicates that schistosomiasis japonica, as seen in American soldiers in the Philippine Islands, gives rise to an acute febrile illness with headaches, diarrhœa and generalised muscle pains Indigenous patients suffering from schistosomiasis very frequently abscond from the course of treatment prescribed, as it is uncomfortable having daily injections of antimony, and with the older methods the course takes three weeks To get over this difficulty, treatment should be of short duration and efficient It is advisable to instruct patients to come for re-examination three months after the completion of treatment and again at a year If there are any residual symptoms present at one year after treatment, the patient should be cystoscoped or sigmoidoscoped depending on the condition present and the type of infection known to have existed A well bound register should be kept for recording the treatment of schistosome cases, as otherwise records may be lost and it is difficult to compare or investigate the efficiency of methods of treatment at a later date

VARIETIES AND DISTRIBUTION

There is a very large number of varieties of schistosome parasites which affect various animals and birds all over the world Fortunately man acts as a primary host to only three well recognised types of schistosome, these distinct kinds being *Schistosoma hæmatobium*, *S mansoni* and *S japonica* A fourth type, *S intercalatum*, recognised in the Belgian Congo as a cause of chronic diarrhœa, has been described by Fisher [4] as having an ovum very like that of *S hæmatobium* With *S intercalatum* the large gut and rectum are affected and not the bladder In this respect it simulates *S mansoni* although the egg appearance is like that seen in *S hæmatobium*, but smaller in size *S bovis* of cattle may also affect man on rare occasions It is quite likely that there are other schistosome infections of man not yet recognised Experiments have been carried out in various parts

7 Loss of appetite
8 Swimmers' itch in 10 per cent
9 Headache in 90 per cent
10 Diarrhœa in 60 per cent
11 Eosinophilia leucocytosis

It is of considerable interest to note the percentages given for some of the symptoms Diarrhœa is more likely to be a prominent sympton in cases of *S japonica* than where *S hæmatobium* or *S mansoni* infections are concerned This list of symptoms may be useful when considering the possible cause of fevers in the tropics All forms of schistosome infection have initial symptoms of a somewhat comparable type though they may vary according to the type of infection present Schistosome infections are seldom considered in cases of stiff neck though he noted that this symptom occurred in 50 per cent of the cases *Schistosomiasis is also seldom considered* as a cause of constitutional upsets Cases have been seen personally on many occasions of a child being referred to a surgical department because of an unexplained torticollis, but schistosomiasis was not looked for specifically in spite of no evidence of bone disease being detected in the cervical vertebræ on X-ray examination Cases have even been put in a supportive neck plaster of Paris to rectify the position and ensure complete rest In one case schistosome ova were found in the urine at the end of treatment, but were not considered to be in any way connected with the stiff neck when in fact schistosomiasis may have been the cause of the condition The parents of the child were told to bring him back for treatment of the schistosomiasis after a period of rest at home, but the patient was never seen again To point out this *error in diagnosis may be a help to others Schistosomiasis is seldom diagnosed* until complications occur, namely, the passage of blood in urine or stool which is an accompaniment of the passage of ova produced by the mature worms in the tissues The ease with which the ova can be detected in urine and stool specimens in a high proportion of the cases has greatly over-emphasised the importance of the finding of the ova, as being the only method of diagnosing these conditions, or investigating the disease If ova are not found in specimens of urine or stool, the diagnosis of schistosomiasis is usually disregarded This is most unfortunate, as in some cases of schistosomiasis no ova can be found in specimens, even after repeated examinations, yet section of tissue removed from an abdominal mass after operation may show schistosome ova present Cases which are classified as chronic appendicitis are frequently found in the tropics to be cases of schistosome infection as seen from the presence of the characteristic ova on section of the appendix In many of these cases no ova are found in the urine or stool before the operation, or even after it when the real diagnosis is known In a number of cases *schistosome ova are not looked for before appendicectomy* for chronic appendicitis in the tropics

Ling, Cheng and Chung [10] also give a list of the symptoms noted in cases of *S japonica* as

1 Fever
2 Cough
3 Diarrhœa
4 Abdominal pain
5 Pallor
6 Itching skin
7 Epistaxis
8 Urticaria
9 Splenomegaly
10 Hepatomegaly

Although the non-schistosome fluke diseases are common in many parts of India, schistosomiasis is very rarely found in that country. Gadgil[8] reported a high rate of *S. hæmatobium* infection in the Gimlova area of the Ratnagiri district of Bombay State. The old people of the district indicated that the signs and symptoms by which the disease is recognised have been known to the local people for many years, since their childhood. Only a small number of sporadic cases have been found elsewhere and these are thought to have been imported from outside India by travellers and soldiers serving overseas.

S. hæmatobium infection rates in Ghana, West Africa, vary greatly from one district to another. In some areas the infection incidence is nil, while in other parts the incidence is up to 90 per cent. amongst school children. The overall incidence is approximately 3 per cent. in the lower third of the country, 10 per cent. in the middle third of the country and 30 per cent. in the upper third of the country. This is a fair working average. The patients showing ova in the urine are predominantly those of school age. Ova are less frequently seen in adults over the age of 30 years. The condition is much more common in males than females. The apparent infestation rate with *S. mansoni* is much lower than that found for *S. hæmatobium*. *S. mansoni* ova are much more difficult to find in the stool specimens than are *S. hæmatobium*, but biopsy specimens are more commonly positive for *S. mansoni* than for *S. hæmatobium*. The impression is gained that *S. mansoni* ova do not penetrate the muscle and mucous membrane easily, but remain lodged in the deep tissues for mechanical reasons largely. *S. hæmatobium* ova have the advantage of any pointed object in the tissues, namely that there is a natural tendency for them to move forward as does a broken needle in the tissues in the direction of the point.

S. intercalatum and *S. bovis* may on rare occasions be found in man.

CLINICAL MANIFESTATIONS, PRIMARY AND SECONDARY

In considering the clinical manifestations of schistosomiasis it should be appreciated that the pattern of the pathology associated with each of the types of schistosomiasis commonly seen in man bears a close similarity. There is an initial contamination of skin or mucous membranes by the cercariæ of the particular type of schistosome concerned. These embryonic organisms, which are found in contaminated water, penetrate the skin surface of the body. Ritchken[9] writing on the "Fevers of Africa," indicates that there is an incubation period between the time of entry of the cercariæ through the skin of the person infected and the time when generalised symptoms are noted. This interval varies from four to ten weeks. After this period there is an onset of fever, malaise, urticaria, eosinophilia and slight cough. Burtner[3] describes the initial manifestations of *Schistosoma japonica* with considerable detail, as seen in American soldiers in the Philippine Islands; he mentions the following symptoms and signs as occurring in the initial illness:—

1. Malaise
2. Stiff neck in 50 per cent.
3. Angioneurotic œdema
4. Muscle pains
5. Joint pains
6. Epigastric and liver pains

genito-urinary system It is obvious from these figures that most patients had many structures involved To think of a case of schistosomiasis in terms of a bladder or rectal infection alone is quite wrong, for this is seldom the case It is important to note that with *S mansoni* infections the upper urinary tract is seldom involved in male patients, and not involved at all in female patients examined in this series of cases Considering that more than 100 cases were examined very carefully, the findings can be taken to be very authoritative Involvement of the kidney and ureter is due almost exclusively to *S hæmatobium* Honey and Gelfand,[11] investigating cases of hydronephrosis, noted that although in some cases where there was marked dilatation of the ureter and pelvis of the kidney there was no ureteric stricture present This observation is worth comparing with that of Koberle [15] who, working in South America, noted that in cases of megacolon in children there was involvement of the walls of the rectosigmoid area of the colon below the dilated portion by broken-down pseudocysts of Chagas' disease in 95 per cent of those examined This is a number which greatly exceeds that found in patients who have Chagas' disease but not megacolon He suggests that the breaking down of pseudocysts possibly releases a neurotoxin locally which damages the neuromcusular mechanism of the autonomic system in the affected area This dysfunction of the neuromuscular mechanism is thought to interfere with the rhythmic action of the bowel In megacolon there may also be a bladder dysfunction in some of the cases There was dilatation and hypertrophy above the physiologically obstructed area of the colon

It is of interest to speculate that there may possibly be a comparable degeneration of the neuromuscular junction system at the lower end of the ureter in *S hæmatobium* infections it would, however, be difficult to prove this Edington [2] indicates the very extensive pathology associated with schistosomiasis, liver damage, secondary to schistosome infection, was found in only a small proportion of his cases, possibly 2 to 3 per cent Dimmette,[16] working in Egypt, considered schistosomiasis and malnutrition to be the two greatest causes of liver degeneration with fibrosis and the subsequent further changes due to cirrhosis Considering cases of carcinoma of the bladder, Edington found that whereas only 30 per cent of biopsy specimens from cases of bladder malignancy showed schistosome ova, in autopsy material 71 per cent of bladder carcinoma showed schistosome ova in the sections Fig 79 shows a specimen of bladder and prostate removed from a patient The ureters were transplanted into the sigmoid colon Fig 80 shows a section of the carcinoma tissue removed with schistosome ova present in it In patients suffering from schistosomiasis and whose decease was ultimately considered to be due to that disease, 37 5 per cent ultimately died as a result of infection in the upper urinary tract Disease due to this condition was also noted in the liver, lungs, spleen, ovary and Fallopian tubes as well as in the primary sites of the bladder and rectum Alves and Gelfand [17] found on careful examination of fifty post-mortem specimens that the most likely place to find bilharzia ova in the male genital tract was the prostate and the seminal vesicles Van Beukering and Vervoorn [18] noted schistosome ova in hydrocele fluid Mynors [19] treated a case of schistosomiasis of the lower end of the ileum by gut resection and anastomosis and found on sectioning the tissue removed,

In their series of cases 80 5 per cent of them showed positive stool specimens, but it was necessary to undertake further investigations to detect the remaining 19 5 per cent of the cases The further investigations were all of a surgical nature, biopsy of rectal mucous membrane and biopsy of internal organs at operation revealed the remaining cases It is in cases where ova cannot be found in the urine or stool of schistosome cases that the diagnosis may be most important The use of skin tests and complement fixation methods have their greatest usefulness in these cases, and if positive, indicate the necessity of continued investigation These tests will be referred to in the next section The tests may also be slightly positive at a time before the ova can be found in the urine and very soon after the constitutional symptoms of the disease develop Unfortunately facilities for undertaking these skin and complement fixation tests are seldom available, but they could be organised without much difficulty if requests for them were received from doctors undertaking clinical work

The skin manifestation of schistosomiasis may be of two distinct types The initial variety, swimmers' itch, is of the urticarial kind representing an immediate reaction against the foreign protein introduced with the entry of the cercariæ This occurs some hours after contamination It goes off during the next few days The other form of skin rash found in cases of schistosomiasis is also urticarial in type but is noted at the time of constitutional disturbance about one to two months after the initial infection is contracted Nagaty, Moawad and Salem [11] demonstrated schistosome ova in these lesions This urticaria may represent a skin reaction to primary ovulation of the schistosome worm At this stage, no schistosome ova have worked through the bladder wall, so none are found in the urine Gilges,[12] working in East Africa, quoted a case of single skin polypus which, when removed and sectioned, was found to contain schistosome ova quite unexpectedly, it was the only evidence of the disease detected This record is important and it indicates the desirability of sectioning any form of benign tumour the pathology of which is uncertain Edington [2] noted a case of ulceration of the vulva which, on section of the tissue removed, was found to contain schistosome ova Urinary fistulæ in male patients, which are placed close to the base of the penis, may on occasions also be due to schistosomiasis which has spread from the prostatic area The onset of hæmaturia and bladder symptoms seem to occur about two to four months after contamination by the infecting organisms The interval may be very variable and possibly depends to some extent on the heaviness of the infection contracted Probably some cases of schistosomiasis are missed altogether because of the infection being very light, and very few ova are found in the urine or stool In heavy infections they are very much more likely to be found Because of the difficulty of finding the ova in some cases of this disease, Gelfand and Ross [13] undertook a very thorough investigation of 110 African subjects post mortem who were known to be suffering from schistosomiasis during life, and by section of tissues from various parts of the body and examination of artificially digested tissues, worked out the percentage of infections in various parts of the genito-urinary system in male and female patients A valuable extract of their findings is given at the end of this chapter showing the percentage infection of the various parts of the

which was thought to be Crohn's regional ileitis, that the essential pathology was that of schistosomiasis Deschamps [20] noted a case of hepatic granuloma due to schistosomiasis, and the nature of the condition was confirmed by biopsy and section Schistosomiasis should certainly be considered in terms of a general disease rather than in terms of a local bladder or rectal condition A case of considerable interest was encountered personally where an African boy of about 16 years of age with schistosome ova in the urine was admitted to hospital with what appeared to be intestinal obstruction On rectal examination there was a large smooth swelling in the mid-rectal position The mass contained fluid as judged by palpation and fluctuation was present There was no ulceration of the rectal mucous membrane over it The patient's abdomen was grossly distended and it appeared necessary to undertake a laparotomy On opening the abdomen it was found that there were three large subserous hæmatomata present about the sigmoid colon and rectal areas These contained up to at least a pint of blood in a dark clotted state The large bowel contained much gas, though there was no evidence of volvulus The hæmatomata were evacuated and extensive masses of clot removed A long rectal tube was inserted into the lumen of the bowel, deflating it A peculiar feature about the case was that there were many small pedunculated masses of an orange-brown shade, polypus-like in appearance, attached to the large bowel on its antimesenteric border These masses contained soft pultaceous material like yellow sand The colour was very like that seen when undertaking a cystoscopy in an early bladder schistosome case, before secondary infection has taken place, minute yellow ochre-coloured particles attached to the bladder wall close to minute thrombosed vessels being not uncommon The nature of this material is uncertain, but it is rather characteristic This minute yellow-spot appearance is also seen about the edges of the minute ulcers present in the rectal mucosa when a sigmoidoscopic examination is being undertaken in a case of *S mansoni* infection This yellowish tinging is sometimes seen also in cases of schistosomiasis affecting the vermiform appendix It would seem that in West Africa about 20 per cent of cases of chronic appendicitis are due to schistosomiasis These cases are invariably associated with low grade chronic discomfort but they are seldom acutely inflamed

The association between schistosomiasis and portal hypertension is well established In a fair proportion of these cases a fibrosis of the liver is found with schistosomiasis Willard [21] reported a case of hæmatemesis which was fatal A *Schistosoma mansoni* worm was found in the ruptured œsophageal varix Gelfand [22] comments on finding schistosome ova in the coats of the pulmonary artery This condition is termed " cor pulmonale " and is well known There is a resultant endarteritis and secondary granuloma formation in the wall of the artery A resultant back pressure develops and there is marked strain on the right side of the heart In Egypt about 2 per cent of cases of schistosomiasis die of right-sided heart failure This condition of cor pulmonale is quite a serious entity and if it exists and a patient is subjected to a general anæsthesia for any reason, such as manipulation and plaster of Paris for a minor fracture or for suturing a wound, he may unexpectedly collapse In about 60 per cent of schistosomiasis cases there is some pulmonary involvement and schistosome ova are sometimes



Fig 79
Specimen of carcinoma of the bladder removed with prostate
(Photograph by kind permission of Mr J N J Hartley, O B E, F R C S)



Fig 80
Microphotograph of carcinoma of bladder showing schistosome ova × 250
(Photograph by kind permission of Mr J N J Hartley, O B E, F R C S)

necessary in advanced cases to be very careful to exclude carcinoma of the bladder which is usually quite obvious if present

Most of the cases of carcinoma of the bladder associated with schistosomiasis have been found to be situated on the lateral wall In some cases the vault is the part involved The trigone area has been found to be involved much less frequently in association with schistosomiasis Where carcinoma of the trigone area occurs it is usually secondary to malignant disease of the prostate and not associated with schistosomiasis Cystoscopy in both male and female patients can be undertaken, satisfactorily in almost all cases, if the patient is given *100 mg* of pethidine intravenously just before the examination Using this method the patient seldom resents the passage of the instrument, or complains of undue discomfort Local anæsthesia is much less satisfactory In cases of chronic bladder pain, thought to be due to schistosomiasis, but in which no ova can be found, it is often helpful to X-ray the patient's lower abdomen In some of these cases there is a definite deposit of calcium in the walls of the bladder and this gives rise to a radiographic appearance not unlike that of a fœtal head at the age of five months' gestation In spite of a gross secondary infection in many late cases of schistosomiasis of the bladder, stone formation has been seen on very few occasions

Rectal schistosomiasis due to *S mansoni* is seen much less frequently in West Africa than is *S hæmatobium* of the bladder *S hæmatobium* may also affect the rectum and may be present quite as frequently as *S mansoni* It would appear that the terminal-pointed nature of the *S hæmatobium* ovum would make it much easier for this type of ovum to pass through the wall of the bladder than is the case with *S mansoni*, with its laterally placed spine, or with *S japonica*, with its more circular shaped ovum and very small laterally placed spine Any pointed foreign body in the tissues, as points of needles and metal fragments, tend to proceed in the direction of the point Possibly for this reason the ova of *S hæmatobium* are found more easily than the ova of *S mansoni* The *S mansoni* and *S japonica* ova may not be extruded nearly so easily The impression is gained that biopsy material is much more frequently positive in cases of *S mansoni* than in cases of *S hæmatobium* when tissue is removed from the rectum It can be seen from the extract that Gelfand [13] found *S hæmatobium* present in the rectal tissues almost twice as frequently as *S mansoni*, so if *S mansoni* is found more often in biopsy specimens it is not because the infection is more frequent but it may be that the ova are retained in the tissues to a greater extent

On sigmoidoscopic examination in cases of schistosomiasis of the rectum the appearance did not seem to differ as far as could be noted in *S hæmatobium* and *S mansoni* infections There are in some cases small irregular punctate ulcers present Not infrequently there is a yellowish discoloration about the edges which is not seen in amœbic ulceration The appearance of the rectal mucous membrane varies considerably from case to case Azar [23] found that on undertaking rectal biopsy examinations and urine examinations on male Bantu school children *S hæmatobium* ova were present with equal frequency in the rectal specimens and the urine It was noted that in a high proportion of the cases the ova found in the rectal mucosa were not viable In some cases where a

found in sputum These observations are recorded in order to emphasise the importance of realising the numerous secondary manifestations of this disease which may give rise to difficulty in diagnosis from lack of caution Many of the conditions mentioned may not require any form of surgical treatment but must be kept in mind when considering the diagnosis of any subacute or chronic abdominal condition Manifestations of schistosomiasis may be seen also in parts of the body other than the abdomen at times It is very difficult, and seldom practical, to examine all patients for all possible conditions which might give rise to the symptoms of which they are complaining In areas of the world where schistosomiasis is prevalent every effort should be made to exclude this condition where there is any uncertainty as to the diagnosis This is of particular importance in any conditions affecting the intestinal or genito-urinary tracts

Patients in the tropics who come to hospital complaining that they have seen blood in their urine usually have schistosome ova in their urine Schistosomiasis is the commonest cause of hæmaturia in children and young adults It may be necessary to undertake two or three examinations before the ova are detected Much time is saved if patients are instructed to bring to hospital a small specimen of urine collected at the end of micturition on passing urine first thing in the morning Ova are most easily found in a terminal specimen of morning urine The patient should be instructed to take a clean glass container to his bedside at night in readiness for use in the morning To put the specimen in a conical-ended glass jar at hospital for an hour or so before examination is also a help in localising the ova The urine at the apex of the jar should be taken up with a clean pipette and examined on a glass slide under a coverslip using the low power objective of the microscope

The cystoscopic appearances of an early case of schistosomiasis of the bladder usually shows petechial hæmorrhages about the base and sides of the bladder, but not at the vault There is quite frequently a small yellow spot close to the position of the submucous hæmorrhages This is very characteristic With the instrument well lighted a fine streak of blood may be seen falling down slowly from the position of the local hæmorrhage There may also be a very fine clotted blood-vessel of a dark red or purplish colour The bladder may not, at this stage, show any obvious increase in general redness or evidence of inflammation The minute hæmorrhages often extend on to the bladder trigone area In later cases there may be a patchy œdema of the lining of the bladder The urine in these cases is usually slightly cloudy due to the presence of blood cells in the urine and pus cells associated with cystitis As the condition progresses the œdematous areas give rise to definite polypoid-looking masses which float in the urine These are seen most conspicuously at the sides and base of the bladder The vault is comparatively little affected though there may be some general hyperæmia from the cystitis present Schistosomiasis of the bladder seldom looks like a papilloma of the bladder, as in the former condition the polypoid masses look a little like minute nasal polypi floating in water They give the impression of œdematous masses rather than floating papillary tissue On occasions there are calcareous-looking sandy patches sticking to the sides of the bladder It is

necessary in advanced cases to be very careful to exclude carcinoma of the bladder which is usually quite obvious if present

Most of the cases of carcinoma of the bladder associated with schistosomiasis have been found to be situated on the lateral wall In some cases the vault is the part involved The trigone area has been found to be involved much less frequently in association with schistosomiasis Where carcinoma of the trigone area occurs it is usually secondary to malignant disease of the prostate and not associated with schistosomiasis Cystoscopy in both male and female patients can be undertaken, satisfactorily in almost all cases, if the patient is given 100 mg of pethidine intravenously just before the examination Using this method the patient seldom resents the passage of the instrument, or complains of undue discomfort Local anæsthesia is much less satisfactory In cases of chronic bladder pain, thought to be due to schistosomiasis, but in which no ova can be found, it is often helpful to X-ray the patient's lower abdomen In some of these cases there is a definite deposit of calcium in the walls of the bladder and this gives rise to a radiographic appearance not unlike that of a fœtal head at the age of five months' gestation In spite of a gross secondary infection in many late cases of schistosomiasis of the bladder, stone formation has been seen on very few occasions

Rectal schistosomiasis due to *S mansoni* is seen much less frequently in West Africa than is *S hæmatobium* of the bladder *S hæmatobium* may also affect the rectum and may be present quite as frequently as *S mansoni* It would appear that the terminal-pointed nature of the *S hæmatobium* ovum would make it much easier for this type of ovum to pass through the wall of the bladder than is the case with *S mansoni*, with its laterally placed spine, or with *S japonica*, with its more circular shaped ovum and very small laterally placed spine Any pointed foreign body in the tissues, as points of needles and metal fragments, tend to proceed in the direction of the point Possibly for this reason the ova of *S hæmatobium* are found more easily than the ova of *S mansoni* The *S mansoni* and *S japonica* ova may not be extruded nearly so easily The impression is gained that biopsy material is much more frequently positive in cases of *S mansoni* than in cases of *S hæmatobium* when tissue is removed from the rectum It can be seen from the extract that Gelfand [13] found *S hæmatobium* present in the rectal tissues almost twice as frequently as *S mansoni*, so if *S mansoni* is found more often in biopsy specimens it is not because the infection is more frequent but it may be that the ova are retained in the tissues to a greater extent

On sigmoidoscopic examination in cases of schistosomiasis of the rectum the appearance did not seem to differ as far as could be noted in *S hæmatobium* and *S mansoni* infections There are in some cases small irregular punctate ulcers present Not infrequently there is a yellowish discoloration about the edges which is not seen in amœbic ulceration The appearance of the rectal mucous membrane varies considerably from case to case Azar [21] found that on undertaking rectal biopsy examinations and urine examinations on male Bantu school children *S hæmatobium* ova were present with equal frequency in the rectal specimens and the urine It was noted that in a high proportion of the cases the ova found in the rectal mucosa were not viable In some cases where a

biopsy specimen removed is found to be positive for schistosomes the mucous membrane may look normal In other cases there is a generalised hyperæmia and in other cases a frank patchy œdema, or the complete mucous membrane may look a rather dull red, and thickened as though it was somewhat swollen In only about a quarter of the cases is ulceration present and when it is the ulcers tend to be of small size On rare occasions a rectal polypus may be found, perhaps in 5 per cent , they do not appear to be very common Dimmette and Sproat,[24] working in Egypt, report rectal polypus present in 20 per cent of their cases This figure is much higher than that found in West Africa When a rectal polypus is present it is usually quite easy to see Rectal biopsy specimens are positive in only about 25 per cent of the cases where schistosomiasis is suspected

Cases of infection with *S japonica* have not been encountered personally and in view of the extensive experience of Pan Ju-Sun [25] reference is made to his article regarding the sigmoidoscopic appearances found in cases of involvement of the rectum with *S japonica* He notes

1 Pale yellow spots and nodules on mucous membrane are characteristic
2 Yellow spots and yellow nodules frequently seen
3 Red nodules with small yellow tips may be seen
4 *S japonica* tends to show polypoid patches between the ulcers
5 Small ulcers only present in some cases, no apparent changes elsewhere

Non-schistosome polyposis is rare in China Pan Ju-Sun found rectal polyposis present in only about 10 per cent of his cases If rectal polypus is present schistosomiasis is found in a very high proportion of the cases Biggam [26] indicates that schistosome polypi can frequently be demonstrated in the sigmoid and descending colon using a barium enema and radiography If polypi have already formed before treatment is given they do not appear to alter in appearance or size on treating the case by antimony, even though the infection may be killed off as indicated by subsequent observations Polypi may be removed in many instances by diathermy current using a special wire loop electrode which is made for this purpose Rectal polypi do not bleed unduly following removal by any method If a diathermy apparatus is not available in country stations they can often be removed from the lower half of the rectum with a tonsil snare and rectal speculum No cases of recurrence have been noted after this procedure, which is technically not ideal but in actual practice very satisfactory

In no case where a polypus was removed from the rectum was the hæmorrhage alarming A colon mass may be due to any form of schistosomiasis In African patients, *S mansoni* is usually found in these cases though *S hæmatobium* is sometimes encountered In the Far East, *S japonica* is always a possible cause The rectosigmoid area of the colon is found to be involved in three-quarters of the cases of colonic schistosomiasis, irrespective of the type of parasite implicated, it is therefore most important to examine that area with the sigmoidoscope in any case of large-bowel tumour formation If there is a schistosome mass present in the cæcum there is a fair probability that the rectum is involved to a lesser extent and a rectal biopsy for schistosomiasis is well worth undertaking even though it may look normal In a fair proportion of the cases where the rectum

looks normal the result is found to be positive Schistosomiasis must be considered in all cases of tumour formation IN ANY PART of the large bowel before the case is treated as a carcinoma These schistosome masses grow slowly and may take from one to fifteen years to develop to the stage of bowel obstruction in the case of *S japonica* according to Ch'en Ming-Chai [27]

In any case of fistula formation involving the bowel or the urinary tract an investigation should be undertaken to exclude schistosomiasis The majority of urethral fistulæ are secondary to urethritis, stricture formation and para urethral abscess following gonorrhœal infections The fistulæ produced by Neisserian infection usually appears about the lower half or back of the scrotum and in the perineum From personal experience it seems that fistulæ in these positions are seldom due to schistosomiasis If, however, the fistula opens close to the base of the penis it usually arises from some form of prostatic disease and this may be tuberculous or due to schistosomes In one case with fistulæ in this high position, prostatic tissue was removed with a transurethral resector and on section was found to be tuberculous, this case brought to notice the association between the fistulæ in the high position and disease primarily in the prostate

In cases of intercolonic intussusception, schistosomiasis should subsequently be looked for after the immediate emergency is dealt with, but this is seldom undertaken Intercolonic intussusception is considered to be a recognised complication of schistosomiasis in the Far East There is a great tendency to neglect further investigation of underlying conditions if after dealing with an urgent surgical emergency the patient is apparently cured Few cases of intussusception in young adults, having had the mass removed, have the tissue sectioned to ascertain if pathology in the wall of the gut was the precipitating factor

METHODS OF DIAGNOSIS AND INVESTIGATION

To consider the methods of diagnosis and investigation following a discussion on the clinical manifestations may appear unusual The intention in this section is to lay stress on the alternative methods which are available for making a diagnosis of schistosomiasis where the finding of ova in the urine or stool is difficult or not possible If the diagnosis of the condition present entirely depends on the finding of schistosome ova under the microscope, then it is not possible to diagnose the condition until the worms are mature and ovulating The duration of the interval between infection by the cercariæ and the passage of ova in urine or stools is probably not less than six weeks as a minimum time Following infection by *schistosome cercariæ* there is a transient dermatitis in a small proportion of the patients, but this is seldom recognised in indigenous patients in the tropics A rash of any sort is much more difficult to see on a dark skin than on a light one Between the initial infection and the onset of constitutional symptoms there is usually a time interval of *from two to four months* This is commonly termed the "incubation period" In some cases it may be somewhat less than two months and in many cases it is considerably longer than four months This stage corresponds to the preovulation stage of the worms' development, during

biopsy specimen removed is found to be positive for schistosomes the mucous membrane may look normal In other cases there is a generalised hyperæmia and in other cases a frank patchy œdema, or the complete mucous membrane may look a rather dull red, and thickened as though it was somewhat swollen In only about a quarter of the cases is ulceration present and when it is the ulcers tend to be of small size On rare occasions a rectal polypus may be found, perhaps in 5 per cent , they do not appear to be very common Dimmette and Sproat,[21] working in Egypt, report rectal polypus present in 20 per cent of their cases This figure is much higher than that found in West Africa When a rectal polypus is present it is usually quite easy to see Rectal biopsy specimens are positive in only about 25 per cent of the cases where schistosomiasis is suspected

Cases of infection with *S japonica* have not been encountered personally and in view of the extensive experience of Pan Ju-Sun [29] reference is made to his article regarding the sigmoidoscopic appearances found in cases of involvement of the rectum with *S japonica* He notes

1 Pale yellow spots and nodules on mucous membrane are characteristic
2 *Yellow spots and yellow nodules frequently seen*
3 Red nodules with small yellow tips may be seen
4 *S japonica* tends to show polypoid patches between the ulcers
5 Small ulcers only present in some cases, no apparent changes elsewhere

Non-schistosome polyposis is rare in China Pan Ju-Sun found rectal polyposis present in only about 10 per cent of his cases If rectal polypus is present schistosomiasis is found in a very high proportion of the cases Biggam [26] indicates that schistosome polypi can frequently be demonstrated in the sigmoid and descending colon using a barium enema and radiography If polypi have already formed before treatment is given they do not appear to alter in appearance or size on treating the case by antimony, even though the infection may be killed off as indicated by subsequent observations Polypi may be removed in many [illegible] wire loop electrode which is made [illegible] unduly following removal by any [illegible] ilable in country stations they can often be removed from the lower half of the rectum with a tonsil snare and rectal speculum No cases of recurrence have been noted after this procedure, which is technically not ideal but in actual practice very satisfactory

In no case where a polypus was removed from the rectum was the hæmorrhage alarming A colon mass may be due to any form of schistosomiasis In African patients, *S mansoni* is usually found in these cases though *S hæmatobium* is sometimes encountered In the Far East, *S japonica* is always a possible cause The rectosigmoid area of the colon is found to be involved in three-quarters of the cases of colonic schistosomiasis, irrespective of the type of parasite implicated, it is therefore most important to examine that area with the sigmoidoscope in any case of large-bowel tumour formation If there is a schistosome mass present in the cæcum there is a fair probability that the rectum is involved to a lesser extent and a rectal biopsy for schistosomiasis is well worth undertaking even though it may look normal In a fair proportion of the cases where the rectum

reliable as when the specific schistosome worms are used to make up the antigen suspension

It is desirable if possible to use for the antigen preparation the type of worm which is causing the infection being looked for Chung Huei Lan *et al* [29] gives details of his experience using a 1 per cent suspension of *desiccated rabbit liver* made up in normal saline The animal had been experimentally infected with 1,000 cercariæ two months earlier The number of infecting cercariæ was fixed as accurately as possible to standardise the strength of the liver antigen The rabbit's liver developed numerous granulomatous masses which contained many schistosome ova Any adult worms found present were discarded The pulverised liver was spread on plates and dried A 1 per cent solution of desiccated liver powder is made up in normal saline as stock solution By this method infected rabbit liver is substituted for the actual worm as originally used by Fairley One part of ethyl mercuric salicylate per 10,000 parts of the standard solution is added as a disinfectant The suspension of liver is set aside for forty-eight hours and then centrifuged at 3,000 revolutions per minute to remove solid particles The supernatent fluid is pipetted off and kept as stock For the purposes of the skin test this stock material is diluted to 1 in 1,000 Using this material a very high percentage of positive skin tests were noted The amount of diluted solution injected for the skin test was 0 1 c c A control injection was given in the other arm using the normal saline with ethyl mercuric salicylate added as used for preparing the antigen A difference of at least 3 mm diameter between the control and the test injection reaction was read as a positive result

Other workers considered it more accurate to make a circular ink mark round the initial weals produced by the two intradermal injections, and if in the antigen weal there was an extension beyond the ink mark it was considered positive, the weal made by the control injection not increasing in size If the antigen weal is conspicuously larger and redder than the control mark the test can be considered positive The reaction can be read within half an hour of giving the injection This means that patients can be tested with fair accuracy as out-patients Pesigan,[30] using this method in the Philippine Islands, found the skin test to be correct in 84 11 per cent of out patients tested and 93 91 per cent in in-patients There were very few false positives In view of the value of skin testing in schistosomiasis it would be a reasonable request to ask for a supply of the antigenic material to be made available from any of the main central laboratories where *the services of a pathologist* is available to undertake the preparation of the material accurately In children the intradermal reaction is not so intense as in adults This is important, making it of particular value in adults In children the ova are usually much less difficult to find With chronic infections the ova are more difficult to find than in early acute infections This may be due to the fibrosis associated with the reaction which is induced by the presence of the ova in the tissues

In old-standing infections very few ova may be found in the urine or stool even though there *are many in the deep* tissues There may be an increased absorption of antigen where the ova are retained within the tissues For this reason the reaction may become more strongly positive Following effective

which time the worms are not mature It seems that the constitutional symptoms are associated with the entry of ova into the tissues Multiple allergic reactions occur as already indicated, headache, fever, urticaria, etc The body's silent reaction during the incubation period gives rise, however, to the development of antibodies in the serum, the antigen invoking the reaction being derived from the developing schistosomes In almost all forms of infection where there is a foreign protein introduced into the body an antigen-antibody reaction is produced This type of reaction is used as a means of diagnosis in many forms of disease The three types of test which have been designed for early diagnosis all depend on this antigen-antibody mechanism These tests are—

1. The complement fixation test
2. The flocculation method
3. The skin sensitivity reaction

Complement fixation becomes positive at about three weeks after initial cercarial infection Serum flocculation is positive at six weeks A positive skin reaction also is noted at six weeks on making the appropriate intradermal injection of prepared antigen Each of these tests is valuable in the preovulation stage of the infecting schistosome As it is an advantage to treat all disease conditions as early as possible, it is also obviously advantageous to make an early diagnosis Schistosomiasis should be considered in cases of fever and urticarial reactions in patients living in areas of the world where schistosomiasis is prevalent A high eosinophilia is also suggestive of worm infection in general

Many useful tests are neglected in tropical countries for lack of facilities and difficulty in getting material with which to undertake the tests The time available in which to undertake laboratory work may be hard to find, essential though this type of work may be It is difficult to attain a high academic standard in country stations with limited facilities and enormous numbers of patients to deal with In order to carry out any of the antigen-antibody reaction tests it is necessary to have a suitable antigen available with which to do the tests Hamilton Fairley[28] made what is probably the simplest possible form of antigen for schistosomiasis tests He used an adult schistosome worm and made up with this a 1 per cent suspension in normal saline The worm is dried and crushed and made into a suspension which is then filtered and this material is used after further dilution for tests The material is sterilised to make it safe for intradermal injection This 1 per cent antigenic solution of schistosome worm is kept as stock solution For undertaking the skin test the stock solution is diluted to 1 in 5,000 and 0 1 c c of the diluted solution is injected intradermally in the arm A control injection with normal saline is used on the opposite arm The degree of similarity between the various forms of schistosomes is such that any form of schistosome can be used for the preparation of the antigenic agent The test is non-specific for the individual type of schistosome Other forms of trematode worms have been used with which to prepare an antigenic suspension in the same manner, and whereas these give a fairly high proportion of positive reactions in schistosome infections the results are not so

reliable as when the specific schistosome worms are used to make up the antigen suspension

It is desirable if possible to use for the antigen preparation the type of worm which is causing the infection being looked for Chung Huei-Lan *et al* [29] gives details of his experience using a 1 per cent suspension of desiccated rabbit liver made up in normal saline The animal had been experimentally infected with 1,000 cercariæ two months earlier The number of infecting cercariæ was fixed as accurately as possible to standardise the strength of the liver antigen The rabbit's liver developed numerous granulomatous masses which contained many schistosome ova Any adult worms found present were discarded The pulverised liver was spread on plates and dried A 1 per cent solution of desiccated liver powder is made up in normal saline as stock solution By this method infected rabbit liver is substituted for the actual worm as originally used by Fairley One part of ethyl mercuric salicylate per 10,000 parts of the standard solution is added as a disinfectant The suspension of liver is set aside for forty-eight hours and then centrifuged at 3,000 revolutions per minute to remove solid particles The supernatent fluid is pipetted off and kept as stock For the purposes of the skin test this *stock material is diluted to 1 in 1,000 Using this material a very high percentage* of positive skin tests were noted The amount of diluted solution injected for the skin test was 0 1 c c A control injection was given in the other arm using the normal saline with ethyl mercuric salicylate added as used for preparing the antigen A difference of at least 3 mm diameter between the control and the test injection reaction was read as a positive result

Other workers considered it more accurate to make a circular ink mark round the initial weals produced by the two intradermal injections, and if in the antigen weal there was an extension beyond the ink mark it was considered positive, the weal made by the control injection not increasing in size If the antigen weal is conspicuously larger and redder than the control mark the test can be considered positive The reaction can be read within half an hour of giving the injection This means that patients can be tested with fair accuracy as out-patients Pesigan,[30] using this method in *the Philippine Islands, found the skin test to be* correct in 84 11 per cent of out-patients tested and 93 91 per cent in in-patients There were very few false positives In view of the value of skin testing in schistosomiasis it would be a reasonable request to ask for a supply of the antigenic material to be made available from any of the main central laboratories where the services of a pathologist is available to undertake the preparation of the material accurately In children the intradermal reaction is not so intense as in adults This is important, making it of particular value in adults In children the ova are usually much less difficult to find With chronic infections the ova are more difficult to find than in early acute infections This may be due to the fibrosis associated with the reaction which is induced by the presence of the ova in the tissues

In old-standing infections very few ova may be found in the urine or stool even *though there are many* in the deep tissues There may be an increased absorption of antigen where the ova are retained within the tissues For this reason the reaction may become more strongly positive Following effective

treatment the skin test tends to become negative in over 60 per cent of the cases, but it may remain positive in some, particularly in adults, possibly due to the lodgment of dead ova in the deep tissues The dead ova possibly act as a source of antigen, continuing to produce a protective antibody long after the death of the adult worms which have been killed off by treatment

In the report of the World Health Organisation on bilharziasis [31] the complement fixation reaction is considered to be an accurate and reliable test for bilharzia in the preovulation stage of the disease Complement fixation tests become positive at about three weeks after infection by the cercariæ This test therefore constitutes the earliest form of test which can give a positive indication of the disease following infection with schistosomiasis The undertaking of complement fixation tests necessitates some skilled laboratory training It may not be possible to have the test undertaken in country outstations The serum might be sent to a main centre for testing by arrangement Flocculation tests using the patient s serum and appropriate antigen can be carried out without undue difficulty in remote stations It would be advisable to carry out a preliminary series of tests using known positive and known negative sera of patients in order to find the serum dilution at which a positive reaction can be relied upon Chaffee and Nieves,[37] working in Puerto Rico as recently as 1957, used an antigen prepared from the schistosome worm itself in a manner similar to that used many years ago (1926) by Fairley They considered the results very satisfactory using this material for sero diagnosis The antigen was treated and buffered to exclude fixation by syphilitic serum

For some years the formol gel method was tried as an aid to diagnosis in schistosomiasis, but it is not accurate Whereas Chung Huei Lan used rabbit liver infected with *Schistosoma japonica* ova, working in Peking, those working in countries where *S hæmatobium* and *S mansoni* are found tend to use rabbit liver infected with *S mansoni* as the antigenic reagent as it is rather easier to infect rabbits with *S mansoni* than *S hæmatobium*

In countries where schistosomiasis is endemic it is not unduly difficult to obtain the adult worms with which to make up the antigenic suspension The worms can be obtained from the pelvic veins of patients who die following violent accidents, which are unfortunately all too common After the worms have reached maturity and are ovulating, the diagnosis is made most easily by finding the ova in the urine or stool, depending on the type of schistosome implicated For the first six months or a year after the schistosomes have reached the mature stage the ova are passed in large numbers in the urine or stool After this time the numbers of ova become very much less In chronic cases it may be extremely difficult to find any ova at all

With heavy infections of *S hæmatobium* in children and young adults, little difficulty is found in discovering the ova in terminal specimens of morning urine To use this terminal specimen of morning urine in which to find the ova is in itself a form of concentration method If a patient is very lightly infected with schistosomes it may be extremely difficult to find any ova at all in the urine, *in these cases special methods need to be employed in order to find the ova* A terminal specimen of morning urine can be further concentrated by allowing

it to sediment in a conical-ended urine glass The eggs being relatively large and heavy sink to the bottom very quickly All eggs sink to the bottom within thirty minutes, most of them have sedimented within fifteen minutes The sediment at the base of the urine glass is removed with a pipette and examined under a microscope, using the low-powered objective The number of ova in a specimen of urine can be markedly increased by asking the patient to take strenuous exercise before the specimen of urine to be examined is passed This is a very simple method and it is often successful in helping to demonstrate ova Centrifuging may be used to concentrate the ova in urine specimens and it is useful in helping to facilitate their detection It may be very difficult to find one single ovum in a large slide specimen made from the deposit of centrifuged urine If a single ovum could be made to "move" it would be very much easier to detect it

Those who have undertaken examination of gland puncture specimens in sleeping sickness cases in Africa will appreciate the advantage of movement in detecting trypanosomes in fresh unstained microscopic preparations In a slide where many active trypanosomes are seen it may be examined an hour later and found very difficult to detect any trypanosomes at all Trypanosomes are very easy to detect when they "move," but they are much more difficult to detect in unstained specimens when they do not move The eye appreciates movement very rapidly under the microscope when it will not recognise a stationary body Using this principle, in the detection of schistosomiasis it is found to be an enormous advantage if schistosomes are suspected but cannot be found, to take a drop of the urine deposit and add this to a few drops of clean water, the ova of *S hæmatobium* hatch out within ten to twenty minutes and even one ovum in a specimen will almost certainly show up as the hatched miracidium starts to "move" about actively within fifteen minutes The miracidium is of a sufficiently large size to be seen with the lowest power of the microscope or even with a strong hand lens A watchmaker's eyeglass is very helpful for this purpose, as well as having many other uses Whereas the hatching rate for *S hæmatobium* is about ten minutes, the hatching rate for *S mansoni* and *S japonica* is ten hours approximately, very much longer The specimen for examination of *S mansoni* or *S japonica* can with advantage be left overnight and examined the next morning The rate of hatching is increased by the addition of sunlight Hatching methods are useful in detecting light infections as well as finding out if the ova are dead following treatment

In Africa the ova of *S mansoni* are seen much less frequently than are the ova of *S hæmatobium* Gelfand and Ross [13] found in post-mortem material that the rectum was infected with *S hæmatobium* almost twice as frequently as with *S mansoni* The bladder and rectum were infected with *S hæmatobium* in male patients with almost equal frequency Although *S hæmatobium* ova are found in specimens of urine they are seldom found in specimens of stool It seems difficult to understand why they are not seen more commonly in routine stool specimen examinations in patients with known schistosomiasis of the bladder If they are passed with equal frequency in stool and urine there is obviously great need to concentrate the ova in stool specimens before undertaking microscopic

treatment the skin test tends to become negative in over 60 per cent of the cases, but it may remain positive in some, particularly in adults, possibly due to the lodgment of dead ova in the deep tissues The dead ova possibly act as a source of antigen, continuing to produce a protective antibody long after the death of the adult worms which have been killed off by treatment

In the report of the World Health Organisation on bilharziasis [31] the complement fixation reaction is considered to be an accurate and reliable test for bilharzia in the preovulation stage of the disease Complement fixation tests become positive at about three weeks after infection by the cercariæ This test therefore constitutes the earliest form of test which can give a positive indication of the disease following infection with schistosomiasis The undertaking of complement fixation tests necessitates some skilled laboratory training It may not be possible to have the test undertaken in country outstations The serum might be sent to a main centre for testing by arrangement Flocculation tests using the patient's serum and appropriate antigen can be carried out without undue difficulty in remote stations It would be advisable to carry out a preliminary series of tests using known positive and known negative sera of patients in order to find the serum dilution at which a positive reaction can be relied upon Chaffee and Nieves,[3"] working in Puerto Rico as recently as 1957, used an antigen prepared from the schistosome worm itself in a manner similar to that used many years ago (1926) by Fairley They considered the results very satisfactory using this *material for sero-diagnosis The antigen was treated and buffered to exclude* fixation by syphilitic serum

For some years the formol gel method was tried as an aid to diagnosis in schistosomiasis, but it is not accurate Whereas Chung Huei-Lan used rabbit liver infected with *Schistosoma japonica* ova, working in Peking, those working in countries where *S hæmatobium* and *S mansoni* are found tend to use rabbit liver infected with *S mansoni* as the antigenic reagent as it is rather easier to infect rabbits with *S mansoni* than *S hæmatobium*

In countries where schistosomiasis is endemic it is not unduly difficult to obtain the adult worms with which to make up the antigenic suspension The worms can be obtained from the pelvic veins of patients who die following violent accidents, which are unfortunately all too common After the worms have reached maturity and are ovulating, the diagnosis is made most easily by finding the ova in the urine or stool, depending on the type of schistosome implicated For the first six months or a year after the schistosomes have reached the mature stage the ova are passed in large numbers in the urine or stool After this time the numbers of ova become very much less In chronic cases it may be extremely difficult to find any ova at all

With heavy infections of *S hæmatobium* in children and young adults, little difficulty is found in discovering the ova in terminal specimens of morning urine To use this terminal specimen of morning urine in which to find the ova is in itself *a form of concentration method If a patient is very lightly infected with* schistosomes it may be extremely difficult to find any ova at all in the urine, in these cases special methods need to be employed in order to find the ova A terminal specimen of morning urine can be further concentrated by allowing

The method using 0 5 per cent stock solution of glycerin is considered most practical and serviceable for routine purposes in country stations where procedures must essentially be simple, tolerably efficient and not too time-consuming The acid-sulphate-detergent method is considered the most efficient, though a little more complicated

In view of the very high incidence of *S hæmatobium* infection in Africa with involvement of the prostate in the male and the body of the uterus and vagina in the female, it is surprising that more attention has not been paid to examination of prostatic fluid in the male and menstrual blood in the female as well as curettings from the uterine cavity and high vaginal smears Hatching methods undertaken with endometrial scrapings may show miracidia Microscopy following section of endometrium is also positive on occasions

If all other methods of demonstrating the ova fail, tissue biopsy can be undertaken The sites where ova can be found are very numerous and reports indicate that any part of the body may be affected The places which are amenable to biopsy most easily are the rectum, bladder, prostate, and endometrium of the uterus The liver and spleen may also be approached by needle biopsy without resorting to open laparotomy

In cases where red blood cells are found in the urine but no schistosomes noted, it may be helpful to X-ray the bladder for calcification A faint circular opacity may be seen in the bladder wall in chronic cases of *S hæmatobium* infection If schistosomiasis of any part of the urinary tract is suspected but cannot be confirmed, particularly in the older age groups of patients, an intravenous pyelogram may show gross dilatation of one or both ureters and pelvis of the kidney Such findings though not diagnostic of schistosomiasis may be strongly suggestive of the condition, in view of the frequent involvement of the upper urinary tract in late cases

If schistosomiasis is suspected and an intra-abdominal operation is advised for any other reason, the opportunity should be taken of performing a biopsy of internal structures Schistosome ova have been found in appendices epiploicæ on occasions To remove one of these fatty masses for examination is a minimal risk to the patient In undertaking a rectal biopsy it is advised that a piece be taken from the edge of a valve of Houston on the lateral wall of the rectum The edge of the valve is practically mucous membrane only and in this position it is easy to get a good bite of tissue without damaging the muscle layers unduly *Working through a proctoscope*, aspiration of blood from the submucous layers of the rectum, using a long needle and syringe such as used for lumbar puncture, may give a fluid specimen which shows schistosome ova on microscopic examination

As well as sectioning the mucous membrane of the rectum following biopsy it is advised that a small piece of tissue be squeezed in a few drops of water and if any ova are expressed they may hatch out within the appropriate time, depending on the type of schistosome present These methods of diagnosis are suggested in a way which may appeal to the younger surgeons and encourage them to try methods which are at present frequently neglected but which if undertaken carefully can be most useful

examination There are four methods recommended by the World Health Organisation's Expert Committee on Bilharzia [31] for the concentration of ova in stool specimens These are

1 Glycerin suspension method
2 The ethyl alcohol procedure
3 The ether technique
4 The "A-S-D" scheme (acid-sulphate-detergent)

To undertake the first method 10 gm of fæces is shaken up in 200 c c of 0 5 per cent glycerin solution in water It is then strained through two layers of surgical gauze to remove large particles It is allowed to sediment on this occasion for thirty minutes The ova settle down to the bottom of the urine glass with some fæcal particles The supernatant fluid is decanted A further 200 c c of 0 5 per cent glycerin solution is added and the lot again shaken up Sedimentation for ten minutes is allowed this time, and after decanting the fluid above the sediment the deposit is taken and spread on a slide and examined for ova The final sediment is spread like a blood film on a glass slide By this method a high proportion of the patients known to be infected with schistosomiasis show schistosome ova in the fæcal specimen examined, when no ova can be demonstrated by the direct method of fæcal testing without concentration In the ethyl alcohol method 10 per cent ethyl alcohol replaces the 0 5 per cent glycerin The procedure is, however, the same emulsification, sedimentation and decanting on three occasions Ethyl alcohol may not be available in the tropics and if available it is expensive Glycerin is much cheaper Ether can be used in the same way, the ether replacing the glycerin the method is the same Ether also is expensive, and if 600 c c is used per examination it would be too expensive for routine practice it might be used on rare occasions

The acid-sulphate-detergent method of concentrating the ova is carried out as follows

One gram of fæces is used To this 2 5 c c of 15 per cent concentrated hydrochloric acid is added The specific gravity of the acid is 1 080 2 5 c c of sodium sulphate solution (Na_2SO_4) is then added, which is of a strength sufficient to give a 1 080 specific gravity, the same as the acid To this is added 0 06 c c of a detergent called "Tritone N E" It is likely that any detergent soap solution made up to the same specific gravity (1 080) could be used and "Lux-Liquid" *is suggested if Tritone N E is not available Detergent soaps* remove fatty and greasy materials very efficiently and it is for this purpose it is used here so that the ova of schistosomes are washed clear of the fatty fæcal particles The total suspension after shaking up is strained through two layers of surgical gauze It is put into a test tube and 5 c c of ether added It is again shaken up The test tube is centrifuged at 1,500 r p m for one minute, the liquid content of the tube is then poured off and the sediment, approximately 10 to 20 mg, is transferred to a microscope slide and covered with a coverglass It is thus examined for schistosome ova Practically all the ova present in the original gram of fæces are present in the deposit transferred to the slide The method is considered to be the most efficient of the four commented upon.

2 Out-patient treatment necessitates much travelling, which is expensive and tiresome

3 Patients mildly toxic with antimony become disinterested in treatment

Patients are usually willing to continue treatment as out-patients up to a maximum of two weeks After this time they frequently default from the daily injections ordered It is difficult to follow up patients in the tropics, where a proportion of the patients are illiterate They may in many instances live a long way from the hospital and postal services are not fully developed There may be many patients of the same name in one village

The essential of drug treatment for these conditions is that it should be safe, of short duration, and efficient Many drugs have been tried The preparations of antimony have, up to the present, proved to be the most efficient Gelfand and Alves [34] administered terramycin to a small series of patients infected with schistosomiasis and found that this preparation was of no value at all Antibiotic drugs do not affect any form of helminthic infection Their only advantage is in the control of secondary infective processes, associated with worm infections The same workers [35] used antimony trigluconate by mouth in twenty-three cases Antimony in this form by mouth was considered to be of no value as there were twenty-one failures out of twenty-three cases treated Miracil D is a complex thioxanthone preparation which is used in tablet form and taken by mouth It may cause some abdominal pain, nausea and mental depression as complications The course suggested for patients treated with this drug is of short duration, being three to five days Whereas the World Health Organisation's Expert Committee on Bilharzia [31] reported that the drug constituted the most effective treatment for *S hæmatobium* infections of drugs given by mouth, with an 80 per cent cure rate, *Harris*,[36] *working in Ghana, considered that Miracil D was* unsatisfactory for mass campaign treatment of this disease Its value in *S mansoni* infections is not yet proved It is considered to be of no value in cases of infection with *S japonicum* This Eastern form of schistosomiasis is more resistant to treatment than either of the other principal types

Antimony in various forms has been established as the drug of choice in all forms of schistosomiasis for many years The two methods of carrying out the course of treatment are the "classical" and the "intensive" schemes In the former method, comparatively small doses are given intravenously over a relatively long time, the course of treatment taking three weeks or more to complete In the latter method relatively large doses are given intravenously over a short period of time, one week or less Several methods are indicated here so that a choice may be made to suit the circumstances of the case The methods are given in order, relative to the number of days they take to complete In patients in poor condition the slower methods using the smaller doses are more desirable than the more rapid methods where large doses are given With the intensive courses the patient should be treated *in hospital and not* as an out-patient

Ritchken and Sanders [37] favour the use of Anthiomaline in the treatment of urinary schistosomiasis and *consider that it gives* a very high rate of cure The

TREATMENT AND PROGNOSIS

The management of the schistosome diseases is an enormous problem in many parts of the tropical world It is largely a Public Health matter Various measures have been adopted to break the life cycle of the particular parasites The problems of clinical practice, relative to these diseases, concern the protection of man against the individual types of disease and the treatment of the conditions in those who are infected Many cases of neglected disease give rise to serious surgical problems Certain workers run a high occupational risk of contracting schistosomiasis by the nature of their employment In West Africa there is a high rate of *Schistosoma hæmatobium* infection in the villages occupied by labouring employees of municipal water works These men have to keep the edges of the catchment lakes clean, remove leaves and branches from about lockgates and attend to minor repairs along the water edges Long rubber boots and gloves would be a great protection to labourers so employed, but it is not very practical attempting to protect all the indigenous workers in this way

Hunter and his colleagues,[33] appreciating the danger of schistosomiasis to research workers dealing with investigations on this disease, found after trials with various applications that the use of 20 per cent benzol benzoate in lanolin was the most effective protective ointment against the entry of cercariæ through the skin Bathing by school children in known infective waters should be prohibited Patients with the disease should be instructed about the danger of spreading the condition by careless contamination of water supplies They usually do not realise the infective nature of the disease from which they are suffering

Schistosomiasis may be suspected but is seldom diagnosed in the early stages of the disease In the absence of complement fixation, flocculation tests, or skin reactions, confirmation of the diagnosis of the condition in the preovulation stage of the parasite, is not possible Only when the various characteristic ova are found in the stool or urine is the condition recognised in most cases Patients in the tropics seldom come early for the treatment of any condition which does not give rise to urgent symptoms This is particularly the case with schistosomiasis There may be blood in the urine for several months or even years before advice is sought There is no doubt that in many instances other persons are infected before the initial case receives treatment and so the condition spreads Infection by *S hæmatobium* in West Africa appears to be a self-limiting disease in the absence of treatment The patient may have a low hæmoglobin level due to constant loss of blood over many months Many patients who are affected by this condition remain in tolerably good health, in the absence of treatment, and do not die from this disease Herein lies one of its greatest dangers The patients are liable to serious internal complications In none of the many cases of carcinoma of the bladder seen associated with *S hæmatobium* did a patient appear to have ever received treatment for schistosomiasis earlier in life A high proportion of the patients in whom these diseases are detected, who start treatment, do not complete the course of injections advised The reasons for this are principally

1 Treatment by intravenous injections, as usually advised, is irksome and uncomfortable

Erfan and Talaat[39] recommended a TWELVE-DAY COURSE of treatment using trivalent sodium antimony gluconate This drug is given by intravenous injection, 3 c c of 6 per cent solution daily being used The material is made up freshly as required, using ice-cold water as recommended by the firm of Burroughs Wellcome who supply the preparation The toxicity of this drug is considered to be only one-third of that of antimony sodium tartrate The results were considered very good

More recently Alves[40] undertook a limited trial of treatment of bilharzia cases with intravenous Dimercaptosuccinate The treatment necessitates a FOUR-DAY COURSE of injections only The drug is supplied by a firm in New York, Messrs Freidheim Sixty schoolboys were treated, 0 4 gm was given daily for four days The powder is supplied in ampoules of 2 gm to which 20 c c of water is added, this gives a 10 per cent solution of the drug Each cubic centimetre of solution contains 0 1 gm of the drug, so 4 c c contains 0 4 gm, which is the appropriate dose The course is very short No complications were encountered No ova were found in the urine of any of the patients so treated six weeks later This preliminary trial appears promising With a short course of treatment of this type it is almost certain that all patients would complete the treatment prescribed

Azar, Tabara and Pipkin,[41] working in Lebanon, have used a THREE DAY COURSE of half-strength Fouadin Fouadin, as supplied by the manufacturers, Bayer-Leverkusen, Germany, contains 13 6 per cent trivalent antimony, or in "half-strength" solution, which is a 6 3 per cent solution, 1 c c of the 6 3 per cent solution equals 8 5 mg of antimony, 8 5 by 34 c c equals 289 mg of antimony or 0 289 gm of antimony The drug in 6 3 per cent solution was given intravenously On the first day three doses were given, 3 c c, 3 c c and 4 c c The total dosage is 34 c c Injections were given at four-hourly intervals by day but not by night A total dosage of antimony of 0 289 gm was used for the full course The results were considered to be excellent All cases were cured The cases were followed up at intervals up to one year There were no severe reactions and no fatalities All cases were treated with bed rest in hospital [illegible] dered s[illegible] table for o[illegible]t-patients This intensive [illegible] therefore [illegible] ome cases when the disease is discovered the time available for treatment may be very limited, such as in schoolboys about to return to boarding school It would appear that the intensive method of treatment, giving large doses over short periods with the patients in hospital, is the most effective method of management in such cases

During any course of antimony, physical activity should be limited because of the risk of myocardial damage due to the drug used Zaki,[42] in a preliminary study on the effect of intensive doses of antimony on the heart, noted a marked electrocardiographic alteration in the cardiac pattern following antimony injections For this reason, if intensive treatment is decided upon, patients should be hospitalised Fang[43] noted the effect of partial thyroidectomy and antithyroid drugs on the toxicity of antimony sodium tartrate in patients with goitre This

course of treatment they advocate takes FORTY DAYS to complete The dosage and method of administration are as follows—the injections are given intravenously every second day Children's course was ½ c c first day, 1 c c. two days later and 2 c c two days later All subsequent injections are 2 c c and are given on alternate days, until twenty injections in all have been given over a period of forty days All cases treated by this method, which could be followed for up to one year, were considered cured Adults treated by this method were given doses first day of ½ c c, two days later 1 c c, two days later 2 5 c c, and on all subsequent injections 3 c c The total dosage in children was 37½ c c and in adults 55 c c There were very few reactions encountered If any of the characteristic signs of antimony toxicity were noted, cough, tachycardia or vomiting, one or two injections were missed before proceeding with the course This method appears to be efficient but it had the disadvantage of taking forty days to complete The " classical " method of treatment of all forms of schistosomiasis is intravenous antimony sodium tartrate given as a 0 5 per cent solution The dosage for adults is 1½ gr daily for TWENTY-ONE DAYS Doses of ½ gr only should be given to children under twelve years of age and doses of 1 gr to patients of average weight between twelve and twenty years approximately One grain is sufficient for adult female patients of light weight The cure rate is considered to be 75 per cent for all types of schistosomiasis when this course is used This rate of cure is not very satisfactory Putting it round the other way, 25 per cent failure would, if applied to any surgical procedure, be considered an entirely unsatisfactory method—even worse than the recurrence rate in hernia operations following catgut repairs Using antimony sodium tartrate intravenously in adults ½ gr is very unlikely to give rise to any reaction at all, doses of 1 gr may give rise to mild reaction occasionally, when 1½ gr is used there may be quite a marked reaction at times, particularly if the patient's general condition is poor Doses of 2 gr should not be given as they are highly dangerous, severe reactions are frequent and fatalities may occur Great care is necessary in the administration of this drug Patients of low body weight should not be given doses exceeding 1 gr In young children ½ gr should not be exceeded

Mills,[38] working in West Africa, treated forty-six young male adult patients on a FOURTEEN-DAY COURSE of anthiomaline intramuscularly The dose was 4 c c daily for two weeks, excluding Sundays Twelve injections in all were given A 95 per cent cure rate was attained This course is the one considered to be most suitable for treatment of *S hæmatobium* infections in out-patients It is a fair compromise between the irksome long " classical " course of twenty-one intravenous injections of antimony sodium tartrate and the " intensive " short course which are given to patients in hospital under close supervision Using the intramuscular route for the injections there is slow absorption, which decreases the risk of acute reactions, and few complications are seen There is sufficient antimony given to ensure a high rate of cure The arm veins are not damaged by repeated injections into them Anthiomaline produces very little local irritation on intramuscular injection It is not unduly painful The drug being supplied in sealed ampoules decreases the risk of infection in the tissues

difficulty in healing The nature of the infection is usually discovered only incidentally on microscopic examination of a section of the tissue removed Rectal polypi due to schistosomiasis, which are not very often encountered, can usually be removed without difficulty with a tonsil snare working through a wide proctoscope A diathermy apparatus may also be used Removal of a polypus from the sigmoid or descending colon through a sigmoidoscope is more difficult Fortunately these appear to be even less commonly seen than those found in the rectum It would seem unwise to attempt closure of a vesico-colic fistula due to schistosomiasis until the basic disease has been treated and cure ensured Attempts at closure of any form of fistula in the presence of active disease is notoriously unsatisfactory, irrespective of the type of disease present It is necessary in these cases, after treatment of the preliminary disease, to allow the patient a limited time of six to eight weeks before complete resection of the areas involved by the fistula is attempted The operative risk associated with excision of a vesico-colic fistula is high This operation should not be lightly undertaken by those with limited surgical experience Every effort should be made to prepare the patient adequately considering his general health and nutrition as well as undertaking preparation of the bowel and bladder

In early cases of schistosomiasis involving the bladder, the patient may become quite well following adequate treatment for the schistosomiasis There may be no evidence of secondary infection present in the bladder as noted by examination of the urine and by cystoscopy Where secondary infection of the bladder exists it is necessary to treat a superadded bacterial infective condition as well as the schistosomiasis Sulpha drugs and tetracycline antibiotics are most efficient for this purpose In some cases it is necessary to give the patient repeated courses Patients with schistosomiasis of the bladder without secondary infection do not usually appear to have a decreased bladder capacity during the first year of the infection In those cases where a calcified bladder shadow appears on X-ray examination corresponding to the wall of the bladder, the size of the viscus as indicated by the shadow is usually of about 12 to 15 oz capacity size It is presumed that the bladder is not completely rigid in spite of the presence of some calcium in its walls Following treatment of bladder schistosomiasis by antimony injections and the secondary infection with sulpha drugs and antibiotics, the bladder may return to almost normal in appearance on cystoscopy There may be some lack of the characteristic smooth appearance of the mucous membrane of the inside of the bladder, particularly about the sides and base This is suggestive of slight œdema of the tissues

In some cases of late schistosomiasis there is marked dilatation of the upper urinary tract There may be complete destruction of the kidney on one side The condition usually becomes "closed" and the patient complains of low grade intermittent pains on one loin The symptoms recur over a period of many years In late cases urine often becomes sterile, and if there is an indication that the condition has become "closed" it is advisable to remove the kidney and ureter A chronic hydronephrosis of this type is a constant source of danger to the patient and is better removed From personal experience it seems that

they
such
appear
to be beneficial in decreasing the toxicity of antimony preparations. This observation is of considerable value, and if mild toxic symptoms are noted following antimony injections these drugs may be used with advantage. They help to control the tachycardia associated with antimony injections.

Infections with *S. mansoni* and *S. japonicum* seem to be much more difficult to treat than *S. hæmatobium* infections. They do not respond so well to antimony drugs. Treatment is given along the same lines as for *S. hæmatobium*. No reports have been noted of the results of treatment by any drugs other than A.S.T. and Fouadin. The cure rate is listed as 70 per cent. with the former drug and 60 per cent. with intravenous Fouadin.

In considering the clinical manifestations of various forms of schistosomiasis, many late complications were noted. Some of these complications require surgical treatment. The basic pathology associated with all surgical complications is partly due to the underlying fibrosis produced by the infiltration of the tissues by schistosome ova. The percentage involvement of the various structures of the genito-urinary system in male and female patients is given in the extract appended to this chapter. Intestinal complications due to the various forms of schistosomiasis have been considered with abdominal surgery. It seems desirable, in the absence of very urgent symptoms of intestinal obstruction or perforation of the bowel associated with schistosomiasis, to treat the basic condition before any surgery is undertaken.

One of the principal reasons for failure of wound healing following surgery, whether this be referable to the skin or deep tissues, is the presence of residual active disease in the tissues which have to be united. It is essential to unite healthy tissues to ensure firm primary union. No cases of fæcal fistula have been noted in patients operated upon for chronic appendicitis associated with schistosome ova in the wall of the appendix. In all cases where the appendix was removed and found later to contain schistosome ova the schistosome infections had occurred many years earlier.

Ch'en Ming Chai and Ch'en Wang Shan Chi[*] having dealt with forty cases of intestinal obstructive lesions due to *S. japonicum* infections, are of the opinion that it is necessary to undertake a preliminary colostomy at some point proximal to the bowel obstruction before dealing with a schistosome bowel mass. Whereas colostomies are not well tolerated by patients in the tropics, because of the lack of privacy in living conditions, they may on occasions be inevitable as a temporary necessity. Intussusception of the left side of the colon may be associated with schistosomiasis. Resection of an intussusception of the left side of the colon is difficult and dangerous because of the fixity of the splenic area of the bowel. It may be more advisable in some cases to undertake a by pass operation". The relief of obstruction by this method usually allows the irreducible intussusception to settle down. The underlying condition should be treated if schistosomiasis is found on section of tissue removed or in stool or urine specimens. The excision of skin polypi due to schistosomiasis does not seem to be associated with any

difficulty in healing The nature of the infection is usually discovered only incidentally on microscopic examination of a section of the tissue removed Rectal polypi due to schistosomiasis, which are not very often encountered, can usually be removed without difficulty with a tonsil snare working through a wide proctoscope A diathermy apparatus may also be used Removal of a polypus from the sigmoid or descending colon through a sigmoidoscope is more difficult Fortunately these appear to be even less commonly seen than those found in the rectum It would seem unwise to attempt closure of a vesico colic fistula due to schistosomiasis until the basic disease has been treated and cure ensured Attempts at closure of any form of fistula in the presence of active disease is notoriously unsatisfactory, irrespective of the type of disease present It is necessary in these cases, after treatment of the preliminary disease, to allow the patient a limited time of six to eight weeks before complete resection of the areas involved by the fistula is attempted The operative risk associated with excision of a vesico-colic fistula is high This operation should not be lightly undertaken by those with limited surgical experience Every effort should be made to prepare the patient adequately considering his general health and nutrition as well as undertaking preparation of the bowel and bladder

In early cases of schistosomiasis involving the bladder, the patient may become quite well following adequate treatment for the schistosomiasis There may be no evidence of secondary infection present in the bladder as noted by examination of the urine and by cystoscopy Where secondary infection of the bladder exists it is necessary to treat a superadded bacterial infective condition as well as the schistosomiasis Sulpha drugs and tetracycline antibiotics are most efficient for this purpose In some cases it is necessary to give the patient repeated courses Patients with schistosomiasis of the bladder without secondary infection do not usually appear to have a decreased bladder capacity during the first year of the infection In those cases where a calcified bladder shadow appears on X-ray examination corresponding to the wall of the bladder, the size of the viscus as indicated by the shadow is usually of about 12 to 15 oz capacity size It is presumed that the bladder is not completely rigid in spite of the presence of some calcium in its walls Following treatment of bladder schistosomiasis by antimony injections and the secondary infection with sulpha drugs and antibiotics, the bladder may return to almost normal in appearance on cystoscopy There may be some lack of the characteristic smooth appearance of the mucous membrane of the inside of the bladder, particularly about the sides and base This is suggestive of slight œdema of the tissues

In some cases of late schistosomiasis there is marked dilatation of the upper urinary tract There may be complete destruction of the kidney on one side The condition usually becomes "closed" and the patient complains of low grade intermittent pains on one loin The symptoms recur over a period of many years In late cases urine often becomes sterile, and if there is an indication that the condition has become "closed" it is advisable to remove the kidney and ureter A chronic hydronephrosis of this type is a constant source of danger to the patient and is better removed From personal experience it seems that

the condition is more common in male patients on the left side than on the right side A left sided nephrectomy is an easier operation than removal of the kidney on the right side The left renal vein is much longer than the right renal vein and so is much more easily ligated during the operation On rare occasions an enormous hydronephrosis may occur In one such case a transperitoneal nephrectomy was undertaken At the time of operation the diagnosis was not certain It was thought that the enormous swelling of the left side of the abdomen could not possibly be due to a hydronephrosis alone, as was found at operation to be the case Following the operation the patient recovered quickly and without complications Carcinoma of the bladder is frequently seen in the tropics in areas where schistosomiasis is common In view of the enormous number of cases of schistosomiasis, the incidence of bladder carcinoma associated with this disease cannot be very high, but carcinoma of the bladder ranks in male patients in the tropics as one of the forms of malignant disease with a relatively high incidence It is seen as frequently as carcinoma of the stomach The prognosis in carcinoma of the bladder seen at any stage is poor most cases of this condition are seen at the inoperable stage, unfortunately In these cases operation can be undertaken only as a palliative measure to relieve pain rather than cure the condition If the rectum is not already involved ureters can be transplanted into the rectosigmoid area The bladder and prostate are then removed completely (Fig 79) The operation is undertaken at one stage

In female patients with carcinoma of the bladder associated with schistosomiasis it is almost invariably necessary to remove the uterus completely with the bladder There is usually temporary improvement in the patient for six months or a year, after which time there is evidence of recurrence of malignant disease at a metastatic site In late cases of carcinoma of the bladder which are in themselves considered inoperable, it is well worth considering bilateral prefrontal leucotomy to relieve the patient s mental distress and appreciation of pain This procedure has been undertaken with satisfaction A photograph of a patient so treated is given in Chapter 7, Fig 59 Fig 79 shows a specimen of advanced carcinoma of the bladder which was resected with the prostate following transplantation of the ureters into the recotsigmoid colon Fig 80 shows a microphotograph of the tissue removed The schistosome ova can be seen without difficulty in the malignant tissue This patient was temporarily relieved by the operation but died some months later from metastatic growths elsewhere

SCHISTOSOMIASIS—CARCINOMA OF BLADDER RELATIONSHIP

There is much conflict of opinion regarding the relationship between malignant disease of the bladder and infection by *Schistosoma hæmatobium* in patients in the tropics If discrimination is made in collecting articles on the subject any conclusion can be arrived at which suits the preconceived personal opinion of the investigator Some writers indicate that there is a close relationship between the conditions, while others think that there is no relationship at all

cases of schistosomiasis of short duration Out of 123 malignant neoplasms observed at Kumasi Hospital, twelve cases, or 10 per cent approximately, were situated in the bladder This finding would suggest that schistosomiasis might be a contributory factor in bladder malignancy

Considering other elements accentuating the possible carcinogenic effect of schistosomiasis, there is a small possibility that the presence of malnutrition may have some influence on the position Many cases of carcinoma of the bladder when first seen are in very poor general condition, but whether this is a contributing cause towards the production of the carcinoma or the result of cachexia resulting from the carcinoma is difficult to say—the latter would appear to be more likely On the position of nutrition, our visiting colleague expressed the opinion that relative to other parts of Africa he visited, the people of the Gold Coast looked " unbelievably well fed " Malnutrition in adults is not a very serious entity in the country, though it does exist to some extent Advanced nutritional diseases such as beriberi and pellagra are not seen very often Nutritional disease in the form of kwashiorkor disease is not uncommonly seen in infants and is associated with unduly early weaning of infants by mothers who become pregnant again a few months after the birth of their last child and so wean the child before it is fit to take an adequate diet other than breast milk There are, of course, many other factors present in the production of infantile malnutrition other than early weaning Cow's milk is not a normal constituent of diet in the people of many parts of West Africa No cases of carcinoma of the bladder were noted in the post-mortem records of the hospital at Kumasi during the time under survey, in spite of the relatively high incidence of patients admitted to the wards with the condition. Edington [45] found thirty cases of carcinoma of the bladder in his pathology records at Accra Sixteen cases were from biopsy specimens, while fourteen were detected at post-mortem examination In biopsy specimens schistosome ova were found in only 30 per cent of the cases, while in autopsy material schistosome ova were found in 71 per cent of cases of malignant disease of the bladder—this latter finding is very significant indeed

In spite of many authorities doubting the relationship between carcinoma of the bladder and schistosomiasis, Edington was of the opinion that schistosomiasis cannot be excluded as an ætiological factor in the production of malignant disease of the bladder Cancer of the bladder is much more common in male patients in West Africa than in female patients there The same higher incidence of schistosomiasis in male patients is noted over female patients From the evidence of clinical practice there seems little doubt at all that there is a close relationship between schistosomiasis of the bladder and malignant disease of that organ Whereas only a small fraction of the many cases of schistosomiasis in the country develop carcinoma of the bladder, there is no doubt whatever that about three out of four cases of vesical carcinoma in the tropics have schistosome ova present in the bladder wall Fig 80 illustrates the appearances of malignant disease of the bladder with the characteristic ova of the parasites also present The overall incidence of malignant disease is probably not quite so high in African patients as in European patients, but the incidence of certain types is very much higher

the condition is more common in male patients on the left side than on the right side A left-sided nephrectomy is an easier operation than removal of the kidney on the right side The left renal vein is much longer than the right renal vein and so is much more easily ligated during the operation On rare occasions an enormous hydronephrosis may occur In one such case a transperitoneal nephrectomy was undertaken At the time of operation the diagnosis was not certain It was thought that the enormous swelling of the left side of the abdomen could not possibly be due to a hydronephrosis alone, as was found at operation to be the case Following the operation the patient recovered quickly and without complications Carcinoma of the bladder is frequently seen in the tropics in areas where schistosomiasis is common In view of the enormous number of cases of schistosomiasis, the incidence of bladder carcinoma associated with this disease cannot be very high, but carcinoma of the bladder ranks in male patients in the tropics as one of the forms of malignant disease with a relatively high incidence It is seen as frequently as carcinoma of the stomach The prognosis in carcinoma of the bladder seen at any stage is poor most cases of this condition are seen at the inoperable stage, unfortunately In these cases operation can be undertaken only as a palliative measure to relieve pain rather than cure the condition If the rectum is not already involved ureters can be transplanted into the rectosigmoid area The bladder and prostate are then removed completely (Fig 79) The operation is undertaken at one stage

In female patients with carcinoma of the bladder associated with schistosomiasis it is almost invariably necessary to remove the uterus completely with the bladder There is usually temporary improvement in the patient for six months or a year, after which time there is evidence of recurrence of malignant disease at a metastatic site In late cases of carcinoma of the bladder which are in themselves considered inoperable, it is well worth considering bilateral prefrontal leucotomy to relieve the patient s mental distress and appreciation of pain This procedure has been undertaken with satisfaction A photograph of a patient so treated is given in Chapter 7, Fig 59 Fig 79 shows a specimen of advanced carcinoma of the bladder which was resected with the prostate following transplantation of the ureters into the recotsigmoid colon Fig 80 shows a microphotograph of the tissue removed The schistosome ova can be seen without difficulty in the malignant tissue This patient was temporarily relieved by the operation but died some months later from metastatic growths elsewhere

SCHISTOSOMIASIS—CARCINOMA OF BLADDER RELATIONSHIP

There is much conflict of opinion regarding the relationship between malignant disease of the bladder and infection by *Schistosoma hæmatobium* in patients in the tropics If discrimination is made in collecting articles on the subject any conclusion can be arrived at which suits the preconceived personal opinion of the investigator Some writers indicate that there is a close relationship between the conditions, while others think that there is no relationship at all

36 HARRIS, F C (1952) A field trial of miracil D for the mass treatment of bilharziasis in the Gold Coast *W Afr med J* 1, 56
37 RITCHKEN, J & SANDERS, E (1956) Urinary bilharziasis—the result of treatment with anthiomaline administered intravenously *Cent Afr J Med* 2, 249
38 MILLS, W G (1946) Treatment of schistosomiasis *Lancet*, 1, 12
39 ERFAN, M & TALAAT, S (1950-51) Trivalent sodium antimony gluconate in treatment of schistosomiasis *Trans roy Soc Trop Med Hyg* 44, 123
40 ALVES, W (1958) Treatment of bilharziasis with dimercaptosuccinate *Cent Afr J Med* 4 15
41 AZAR, J E, *et al* (1951) A report on the intensive treatment of vesical schistosomiasis *Trans roy Soc trop Med Hyg* 45, 383
42 ZAKI, A A (1955) A preliminary study on the effect of intensive doses of antimony on the heart *Trans roy Soc trop Med Hyg* 49, 385
43 FANG, T C (1957) Effect of thyroidectomy and antithyroid drugs on A S T toxicity *Chin med J* 75, 783
44 MUSTACCHI, P O (1956) Occurrence of cancer of the bladder in two Gold Coast hospitals Memorandum to U S A National Cancer Institute
45 EDINGTON, G M (1956) Malignant disease in the Gold Coast *Brit J Cancer*, 10, 595
46 GAMBLE, M G (1954) Vesical carcinoma associated with widespread schistosomiasis *W Afr med J* 3, 48

This applies to carcinoma of the liver and carcinoma of the bladder, both of which greatly exceed that noted in patients in Europe The mild chronic inflammatory condition, produced by the active disease of schistosomiasis and the chronic fibrosis of the bladder wall following cessation of activity of the disease, would appear to be a contributing factor in as far as chronic inflammation anywhere in the body predisposes to the onset of malignant changes in the tissues The opinion is expressed that schistosomiasis definitely does predispose to carcinoma of the bladder

It is advised that cystoscopic examination should be undertaken much more frequently than is the case at present Realising the difficulty of undertaking cystoscopy as often as it should be performed, and the difficulty of getting time to carry out a procedure which is in many cases time-consuming and negative in its findings, it is suggested that the difficulty could be circumvented by having one session a month set aside in which to undertake this procedure alone With two or three cystoscopes available and nurses trained in the procedure, many examinations can be undertaken in one hour, whereas if one case alone is added to an operating list, it may take as long as four cases examined consecutively Cystoscopy is seldom an emergency procedure Any patient known to have suffered from schistosomiasis should have a cystoscopic examination undertaken three months after the completion of treatment and at any time later should bladder pain recur Most cases of carcinoma of the bladder are admitted to hospital at a late stage of the disease when the condition is inoperable as far as cure is concerned

Patients are more willing to have a cystoscopic examination performed if the procedure can be undertaken for them as out-patients The use of intravenous pethidine as a sedative given before starting the examination precludes the necessity for a general anæsthetic Using this method makes the examination easier, quicker and more acceptable to patients and should be encouraged It is thought that if cystoscopy was carried out more frequently it would be found that carcinoma of the bladder is a much more common condition than is even at present believed The age of a patient should not necessarily deter the clinician from considering having a cystoscopic examination undertaken in any case of bladder pain Gamble[48] reports a case of a male patient, aged only 20 years, who died as a result of carcinoma of the bladder On post-mortem examination schistosome ova were found in the bladder growth, a carcinoma *S hæmatobium* ova were also found in the lungs, liver and kidneys

EXTRACTS

CLASSIFICATION of flatworms or trematodes

There are three main groups or super families

The Paramphistomoidea
The Fascioloidea.
The Schistosomoidea

The schistosomes differ from the others in being diœcious or having the male and female worms as separate individuals The other members of the trematode worms are hermaphrodites

seen as a patch of very painful vesicles on the prepuce The associated inguinal glands become painful The condition tends to clear up spontaneously within about one week There is a marked tendency to recurrent attacks The diagnosis is usually not difficult if the condition is kept in mind The points which are in favour of the diagnosis are the recurrent nature of the condition, the multiplicity of the inflamed papules which tend to have the same distribution with each attack The two conditions which give rise to multiple small painful ulcers about the prepuce and coronal sulcus of the penis are genital herpes and Ducrey's soft sore In cases of soft sore there is usually no history of previous attacks The inguinal adenitis is much more extensive than is seen in cases of herpes and frequently goes on to bubo formation No cases of abscess formation have ever been noted in cases of genital herpes, but abscess formation is very frequently seen in cases of soft sore The minute ulcers of herpes are not progressive, they tend to heal quickly, unless there is gross superadded infection locally Herpes is not associated essentially with exposure to venereal infection The incubation period of soft sore is one week Local irritation of the prepuce may be noted about five days after the infecting intercourse, and a definite small sore occurs two days later Several small ulcerated areas may be noted The differentiation between soft sores and herpes ulceration may be facilitated by the finding of Ducrey's bacilli in the discharge from the surface of a soft sore Herpes *is a self-limiting disease, even though it tends to recur Adequate local washing* followed by the application of calamine lotion improves the condition and eases the discomfort Some weeks after the inflammation has settled down, uncircumcised *patients should be circumcised, as recurrence of the condition is very likely* The prepuce is the part of the penis most frequently affected This minor operation can be undertaken using local, spinal or general anæsthesia Circumcision under intravenous barbiturate anæsthesia is not advised There have been many alarming reactions noted in patients by doctors employing this method Other forms of anæsthesia are therefore considered more suitable for the procedure

Scabies, though seen in all parts of the world, is much more frequently encountered in tropical areas The condition is most common in children and young adults The parts most commonly affected are the hands, the natal folds of the buttocks and the prepuce The condition gives rise to marked irritation of the affected parts In an effort to relieve the discomfort by scratching, minute abrasions occur and secondary infection develops In some cases crusted sores are noted and these may break down into open ulcers This form of non-venereal genital ulceration is not uncommon in young uncircumcised boys of the poorer communities in the villages of the tropics It is necessary to instruct the patients and the relatives concerning the importance of proper attention to cleanliness of bedding and the necessity of adequate laundering of clothes Following bathing, the application of benzol benzoate emulsion is useful for killing off the causative parasites This substance is very poisonous, and in ordering it patients should be informed of the danger of *leaving the bottle containing it in any place* accessible to young children Many other remedies are available Chronic inflammation of the prepuce due to scabies predisposes to stenosis and it is desirable if chronic infection is present to have the patient circumcised Scabies

10

Genito-urinary Diseases in the Male

ULCERATION OF EXTERNAL GENITALIA

IN dealing with diseases of the genito-urinary system it is convenient to describe the various forms of ulceration of the external genitalia together, even though they represent the early manifestations of not one disease entity but the beginnings of many serious diseases which affect diverse parts of the body A high proportion of cases of genital ulceration in sexually mature males are of venereal origin Venereal ulceration in male patients is rare in the tropics under the age of 16 years Wilson Rae,[1] considering the conditions which predispose to venereal diseases in the tropics, notes that there is a high incidence in the following circumstances

1 Amongst the persons living in the large seaports
2 In industrial communities where labourers are detached from their hinterland homes
3 Amongst tribes where social customs entail promiscuity, as in parts of East Africa
4 In communities where illegitimate birth rate exceeds legitimate birth rate
5 In primitive communities where venereal diseases, so-called, are not necessarily associated with sex relations

The apparent incidence of venereal disease, as indicated by Willcox,[2] depends not so much on the actual number of cases present in any community as on the vigilance of the Health Authorities in discovering cases Under these circumstances figures are very misleading The figures of eminent authorities on veneral diseases are not in agreement with the findings as seen in clinical practice by those who have worked in West Africa for many years It is therefore of no value in a work on surgery to discuss the merits or demerits of their findings It is agreed by the authorities themselves that the figures given are merely the findings as presented to them without discussion of the reasons for the peculiarities noted There is no doubt, however, that the incidence of venereal disease varies greatly from one district to the next In one area south of Sokoto in Northern Nigeria the incidence of syphilis is much higher than in most other parts of West Africa, while in some of the coast towns of West Africa the incidence of lymphogranuloma inguinale is out of all proportions above that found in other nearby coast towns

In considering genital ulcerations it is necessary to keep in mind the possibility of non venereal conditions Herpes of the penis is seen most commonly on the prepuce of uncircumcised patients The condition is much less common in persons who are circumcised Genital herpes, like herpes about the mouth, is

an extensive pustular eruption Damp areas of the body such as the axilla, the groins and the perineum and scrotum are frequently extensively affected in children Purulent scabbed masses of rather a circular shape are seen They are usually 1 to 2 cm in diameter The condition is obviously of a generalised nature Treatment of yaws by bismuth injections gives poor results and is being given up The number of injections required for treatment by this method necessitates an excessive expenditure of staff time and is therefore expensive in spite of the low cost of the drugs used Treatment by intravenous novarsenobenzol is much more efficient With care small doses can be given even to small children A suitable dose is 0 1 gm for children between the ages of 5 and 10 years, appropriate smaller or larger doses, depending on age, can be given to children below or above these ages respectively One injection may clear the lesions up, but probably not less than twelve injections are necessary to cure the disease completely Much the most effective method for treatment of yaws is deep intramuscular injections of penadur penicillin This drug acts for a prolonged time One injection of a million units is sufficient to clear up all manifestations of external disease It is probably advisable to give four injections of 1 million units once a week for a month to cure yaws completely

There are five venereal diseases in which ulceration about the prepuce or glans penis is noted These must be differentiated carefully The nature of each disease is different and the methods of treatment also are different These five diseases are syphilis, soft sore, lymphogranuloma inguinale, ulcerative inguinal granuloma and condyloma acuminata

In more than 90 per cent of cases of syphilis, infection is contracted following sexual intercourse with an actively infective person of the opposite sex In some parts of the world non-venereal syphilis is noted, particularly in semi desert areas of the Middle East The incubation period of syphilis is approximately one month The primary sore, which is markedly indurated, is not usually associated with much pain There may be slight enlargement of inguinal glands, but these are not painful The comparative absence of pain is important in differentiating syphilitic sores from soft sores, the latter being by contrast very painful Syphilitic sores are usually single, though not necessarily so, while soft sores are usually multiple though again not necessarily so The term "hard chancre" for syphilitic sores and "soft chancre" for sores due to infection by Ducrey's bacillus have been adopted in view of these characteristics which are typical of the individual conditions of which they are the primary manifestations If a syphilitic chancre occurs on the prepuce, it has an almost button like hardness surrounding the indolent ulcerated area, whereas a soft sore does not have this indurated character At the early ulcerated stage of a syphilitic sore the serum Wassermann reaction has not had time to become positive, it is therefore not of value in early diagnosis of syphilis The essential in diagnosis is the finding of the causative organism from the primary sore The *Treponema pallida* is found in serum expressed from the sore and examined under the dark-ground illumination apparatus of the microscope The sore should be initially cleaned with saline to remove surface exudate and cellular debris By gentle pressure serum is expressed, this should consist of serum only as far as possible The serum can be collected

of the prepuce seldom gives rise to difficulty in diagnosis in view of the ease with which manifestations of the condition are seen elsewhere on the body There is no indication of any venereal origin Usually several members of the same household are affected

A type of ulceration which may give rise to difficulty in diagnosis in the tropics is that due to red mites which most frequently become attached to the thin skin of the external genitalia It is mentioned here as the condition is not well appreciated and many cases of this type of acarid parasitic infection have been seen in the northern territories of West Africa It is seldom seen in other parts of West Africa The affected skin becomes very itchy and after about twenty four hours a minute ulcer develops on the scrotum or about the skin of the penis The ulcer is about one millimetre across The presence of a small ulcer of this type may give rise to considerable concern in some patients suspecting venereal disease It is obvious to those who have not been exposed to the possibility of infection that the condition is not of venereal origin In many cases seen the patients affected have been those keen on horse riding and hunting in bush country Whether the mites are associated with the horses or not has not been discovered The mites are so small that they are very difficult to see without a hand lens, but with a magnifying glass they are easily detected A minute orange-coloured spot, which is the mite, is seen These mites can be pulled off with forceps while the affected skin is pinched between the fingers Removal by this method is quite painful though effective The condition may also be treated by local application of benzol benzoate emulsion followed by a hot bath one hour later The small ulcer produced is very painful but clears up in two or three days following removal of the parasite No cases have been seen where generalised symptoms have followed the bite of this mite

Guinea worm infection of the scrotum may give rise to inflammation, vesication and ulceration at the point where the guinea worm protrudes the head end of the body for the purposes of ovulation Guinea worm infection is common in the semi arid districts of the tropics where water supplies are poor The nature of the condition is usually diagnosed by the presence of the guinea worm in the subcutaneous tissues The parasite gives rise to a long irregular sinuous mark representing the reaction of the tissues to the worm which is present in them Because of the soft nature of the tissues of the external genital organs, a guinea worm coming to the surface in this position may frequently be removed at one session complete on winding it out on a matchstick in the classical manner Guinea worms come to the surface of the body more frequently about the lower limbs, but the penis and scrotum are frequently affected (Fig 95) Old calcified guinea worms may be noted in the tissues of the scrotum and inguinal areas on X raying the pelvis for bony injury

Ulceration of the scrotum due to necrosis of broken-down sebaceous cysts is seen occasionally in elderly male patients Associated with the ulcerated area there are usually smaller cysts which are not broken down These give an obvious indication of the nature of the condition

Secondary yaws affecting the penis and scrotum is still comparatively common in some parts of the tropics Many parts of the body are usually

of syphilitic origin. If the patient is suffering from a syphilitic condition the sulpha drug treatment may improve the sore a little due to the decrease in local secondary infection, but the ulcer shows little indication of healing. If the sore is still apparently active after one week's treatment on sulpha preparations, it can be taken to be of syphilitic origin, and treated accordingly. If it is believed that the case is one of soft sore and treated successfully with sulpha drugs, arrangements should be made to have a Wassermann reaction test undertaken three months later as a safeguard. If possible the patient should be encouraged to go to the laboratory for the test rather than sending a blood sample for testing.

If an effort is made to organise Kahn reaction tests in a small station, it is advisable to arrange these at fixed intervals, say twice a month; by so doing there is much saving of time as many tests can be undertaken at one session. Serological blood testing is seldom an urgent procedure. The interpretation of Kahn tests must be considered in the light of the frequently found underlying yaws. Plus one and plus two is the usual finding except in the presence of recent florid yaws and, as before mentioned, only plus-three and plus-four reactions should be considered in the possible diagnosis of syphilis. The test, as also the Wassermann test, is of greater value in Europeans where yaws can be excluded and a weak positive result due to chronic malarial infection is much less likely.

Male patients in the tropics come frequently to a surgical department requesting circumcision because of a sore of the prepuce. The unsoundness of undertaking a circumcision for any form of venereal sore without an absolute diagnosis being established as far as possible is obvious. By the time a local syphilitic sore appears a generalised blood infection with the disease has occurred. In the case of soft sores, it would appear that the only metastatic manifestation of the disease is the inguinal adenitis and abscess formation in some cases. If the prepuce cannot be retracted so that the sore under the skin can be properly seen, it is advisable to undertake a dorsal slit operation as a preliminary method of treatment of the condition. If the sore can be properly exposed and cleaned it heals much more quickly. The result of treatment by sulpha drugs can also be observed carefully. If the therapeutic result of sulpha drug treatment indicates that the sore was probably a soft sore a circumcision can then be undertaken, as a dorsal slit operation, though efficient for the purpose for which it is employed, is cosmetically unsightly. The treatment of syphilitic infections by the intravenous injection of novarsenobenzol probably renders the patient non-infective to the community with six injections of 0.6 gm. This limited course does not cure the condition; syphilis is a difficult disease to eradicate completely. In view of the potential danger of a prolonged course of novarsenobenzol which is necessary to cure the condition, it is considered that the use of N.A.B. should be abandoned in favour of penicillin; this substance is much safer. One million units of long-acting penicillin should be given weekly for ten weeks. The case can thus be treated in two and a half months. This is an enormous advance on the older method of treatment, which necessitated weekly injections for up to two years. Even then, by the older method the patient was left with some doubt as to the permanency of the cure and in many instances suffered from syphilophobia for

with a capillary tube or a very fine pipette It is transferred to a microscope slide and suitably mounted for dark-ground illumination examination It must be remembered that more than one form of venereal ulceration may exist at the same time A syphilitic sore and soft sore may co-exist Microscopic examination for the detection of spirochætes should be undertaken before any treatment is given

Those who have worked in remote stations in the tropics all appreciate the impracticability of depending on serum diagnosis in the recognition of syphilitic conditions in the later stage when they might be expected to be positive Sero diagnosis is of no value in the first two months, at which time help in diagnosis is most urgently required, and if used to detect complications at a later stage serum samples or blood samples sent by any means to distant central laboratories are almost invariably damaged by delay in transit It is not possible to undertake satisfactory tests on hæmolysed or otherwise damaged blood specimens If adequate facilities are near at hand Wassermann reactions are most helpful, but in the absence of easy access to the services of a pathologist, clinical judgment must be relied upon Kahn reactions are not difficult to undertake and can be performed in country stations without undue inconvenience The antigen required can be purchased from the commercial firms and pathology institutes in Europe, America, and no doubt parts of Asia The technique can be followed from laboratory textbooks A minimal amount of apparatus is required—Widal tubes, a rack, a water bath, thermometer and pipettes An automatic shaker is helpful but not essential This method was used personally for some years with satisfactory results It is necessary to exercise care in the interpretation of the results, as many conditions in the tropics give rise to weak positive results in the absence of syphilis Malaria, leprosy and yaws act in this way Syphilitic conditions should only be diagnosed in the presence of a plus-three or plus-four reaction Reactions of plus one or plus two should be disregarded altogether They may be used only as an indication to repeat the test two months later to see if the titre of the reaction has risen In early diagnosis clinical judgment may be the only method available

Many stations do not have a dark ground illumination apparatus available with the microscope set In view of the serious implications of a syphilitic infection, with the possibility of late complications, it is necessary to differentiate on clinical grounds alone between a syphilitic sore and a soft sore In view of the fact that soft sores improve rapidly on sulpha drugs and syphilitic sores do not, it is recommended that if spirochætes are not found on dark-ground illumination examination, or if the examination cannot be carried out because of the absence of the necessary apparatus, a course of sulpha drugs be given initially—two tablets four times a day for one week Ample fluids by mouth decreases the risk of toxic reactions and disturbance The patient should have complete rest in bed at home for the week, or in hospital if necessary Penicillin should under no circumstances be given initially, as this removes one of the valuable means of making a diagnosis of the condition present By the therapeutic method, or seeing the result of treatment, a fairly accurate diagnosis can be arrived at If the genital sore clears up almost completely within one week following the administration of sulpha drugs and local dressings, it is almost certainly not

two conditions are most unfortunate and are probably the result of failure to realise that two distinct conditions exist To differentiate on clinical grounds alone at the early stage is practically impossible Lymphogranuloma inguinale is much the more common disease of the two as far as can be seen from personal experience In lymphogranuloma inguinale in the male the lymphatic glands of the inguinal area are involved with inflammation and subsequent abscess formation In ulcerative inguinal granuloma the ulcer formation of the groin does not appear to be associated with an initial adenitis and breaking down of the lymphatic glands With lymphogranuloma inguinale there is late rectal stricture formation It is seen most commonly in female patients, though it is also seen in a small proportion of male patients With lymphogranuloma inguinale the disease is not spread to other parts of the body by scratching, as is seen with ulcerative inguinal granuloma The spread of this latter disease by scratching and development of keloid formation is commonly seen in indigenous patients in Africa Fig 81 shows a case of an elderly male patient in which this happened With lymphogranuloma inguinale the scarring of the groins is followed by a smooth scar when it heals Keloid formation is associated with ulceration of a deep type involving the fatty layers beneath the skin

FIG 81
Ulcerative inguinal granuloma with late keloid formation

McLaughlin[3] considering a series of cases of lymphogranuloma inguinale in the West Indies, noted that the single primary sore representing the initial lesion of lymphogranuloma inguinale was seen in only 25 per cent of the cases *In 75 per cent of the cases* no primary sore was seen at the time the case presented for examination and treatment The sore was *admittedly of a transient nature* There was marked absence of pain about the sore This is an important characteristic to remember considering that *herpetic* sores are also of small size Small soft sores frequently affecting the same areas are also very painful indeed Four stages were noted in the associated adenitis of the groin

1 Initial discomfort about the inguinal glands *with enlargement*
2 Periadenitis and local œdema associated with marked glandular enlargement
3 Breaking down of the glands with purulent discharge from the groin
4 *Frank ulceration of the groin area*

With the early painful inguinal glands there was a rise in the patient s
[illegible] plateau
was
ome
was
negative in the early stages of the disease Cases originally [illegible] ntly

the rest of his life If syphilis is treated adequately in the early stages, late complications are most unlikely to occur

Most of the complications in untreated cases are the result of degeneration in the various parts of the vascular system These are followed by rupture or thrombosis of blood-vessels Where marked resistance is developed syphilitic lesions are followed by fibrous tissue formation with the development of strictures of tubular structures and thickening of mesodermal tissues, bone, tendon, muscle and joint structures If strictures occur in any tubular structures of the body, not only have the strictures to be circumvented, but the underlying source of disease must be treated It is obviously desirable to make every effort to trace and treat the infective person from whom the infection was contracted The Wassermann reaction is most useful in diagnosing old standing disease of syphilitic origin The occurrence of neurosyphilis in the indigenous patients in the tropics is rare, this may be due to the presence of chronic malaria in most of the residents of the tropics It is well known that experimentally induced malaria in conditions of neurosyphilis in temperate climates has a beneficial effect on the syphilitic condition present In the case of venereal sores due to infection with Ducrey's bacillus, the sore is characteristically multiple, painful and soft as opposed to a syphilitic sore which is usually single, not painful and hard The adenitis likewise in soft sore cases is painful, unlike that of syphilitic adenitis in which the gland though a little enlarged is hard, not painful and not associated with local œdema and pus formation as with soft sore cases If the abscess in the groin discharges it heals slowly The incubation period of soft sore is one week, while the time of incubation of syphilis is one month This is an important point in differential diagnosis Penicillin should not be given in treatment of any venereal sore until the nature of the condition is determined

Lymphogranuloma inguinale is another important venereal disease seen in many parts of the world, but most commonly in the tropics It was seen very commonly in West Africa prior to the introduction of the sulpha drugs about 1936 It is now seen much less frequently As a result of lymphogranuloma inguinale there are many serious surgical complications The condition requires very careful consideration There is unfortunately much confusion between two different diseases seen in the tropics which have a venereal origin and give rise to ulceration about the groin These conditions are lymphogranuloma inguinale due to a virus infection, and ulcerative inguinal granuloma due to a Donovan-like body with some similarity to the inclusion bodies found in leishmaniasis The two conditions bear a superficial likeness to each other In both conditions there is a minute papular sore of transient type, which commonly affects the prepuce or about the frenum or the coronal sulcus at the base of the glans penis In neither case is the ulcer particularly painful and little emphasis may be laid upon it by the patient It is noted in only about 25 per cent of the cases in both conditions

Lymphogranuloma inguinale is associated with a positive Frei skin reaction in a high proportion of the cases within three months of the initial infection The test is negative in ulcerative inguinal granuloma In ulcerative inguinal granuloma, the finding of Donovan bodies on section of tissue removed from the edge of the ulceration is diagnostic of the condition The names given to the

skin test and is therefore worthy of consideration as a clinical sign These bridges of skin may be found about the skin edges of the broken-down inguinal glands Contrary to the general expression of opinion that inguinal glands are not involved in female patients with lymphogranuloma inguinale, it has been found that buboes are present with ulceration of the groin in female patients in about 20 per cent of the cases The ulceration is placed much more medially than in male patients It is incorrect to say that the groin is not infected in female patients suffering from this disease though involvement is less common than in male patients If the primary sore of lymphogranuloma inguinale in female patients is about the clitoris or lesser labia, the homologous parts to the penis and scrotum of the male, ulceration of the groin does occur If the primary sore is within the vagina the lymphatic drainage brings the infection into the deep pelvic glands passing round the rectum In these cases a late rectal stricture develops In about 10 per cent of male patients with this disease rectal stricture develops Most of the cases of rectal strictures noted in male patients have been in the inmates of prisons and are thought to be associated with perverted sex practices in males In cases of rectal stricture in male patients the diagnosis of lymphogranuloma inguinale should be considered At the stage where a rectal stricture is found the Frei test is almost invariably positive



FIG 82
Condylomata acuminata about frenum in male patient

A further type of venereal disease found in the tropics is condyloma acuminata This is a papillomatous type of condition which is sometimes associated with ulceration and bleeding from the ulcerated surfaces It occurs about the prepuce and frenum of the penis It is much less frequently seen in circumcised patients than in those who are uncircumcised Dampness appears to be necessary for its continued existence Fig 82 shows a case of this condition in a young male adult The condition is much more serious in female patients (see Chapter 11) This wet papillomatous-like condition is a serious type of infection as the urethra is quite frequently involved Treatment of the local condition by diathermy is satisfactory but several applications may be necessary If the urethra is extensively involved, diathermy may be followed by the formation of a meatal stricture Following diathermy of the navicular fossa area serious hæmorrhage may occur No form of drug taken by mouth seems to have any beneficial effect on this condition Podophyllin, 1 per cent in oil, has been used

became positive At the latter part of the treatment of the condition, which takes about two months, the test became positive in about 50 per cent of the cases Treatment by intravenous antimony sodium tartrate, which has been in the past considered a standard therapeutic measure in this disease, was found to give poor results Three sulphadiazine tablets four-hourly by day for five days (60 tablets in all) gave results which could be classed as good or very good Penicillin was, unfortunately, not available at the time this series was undertaken In cases where early gland excision was undertaken it was noted to be followed by marked lymph stasis in the local tissues and slow healing Aspiration of pus from the buboes was considered helpful Healing of broken-down glands took as much as two months to complete Pus from the buboes was usually sterile on culture Inguinal glands infected with this disease do not break down in all cases Where glands broke down it was considered helpful to curette the glands to remove the debris and hurry a process which was occurring more slowly by the normal means If sinuses were properly exposed and curetted, local application could be applied more easily The commercial firm of Squibb Ltd makes an antigenic preparation known as Lygranum with which the Frei test can be carried out As this product can be purchased commercially a limited supply should be available in all stations for making tests where this condition is suspected Early excision of inguinal lymphatic glands in cases of lymphogranuloma inguinale is considered unwise—curettage after the abscess ruptures helps

Willcox,[4] considering treatment of lymphogranuloma inguinale in the African subject, considered that a course of sulpha drugs was as useful as anything else Penicillin, though useful in treatment, was not encouraged in the early stage as it was liable to conceal syphilitic infections by killing off spirochætes and so precluding the possibility of finding them by dark-ground illumination examination He considered that the tetracycline antibiotic drugs were also useful in treatment From personal experience of many cases of this condition the opinion is held that chloromycetin is far and away the most efficient drug in the management of this disease It improves the condition with remarkable rapidity Chloromycetin is also most useful in the treatment of cases of ulcerative inguinal granuloma and in view of the difficulty of being certain of the diagnosis in the early stages of either disease it is considered wise to treat the cases with a drug which is equally effective in both conditions In cases of chronic ulceration of the groin the Frei test should be undertaken for lymphogranuloma inguinale A piece of tissue edge with granulation tissue present should also be removed and sent for section and microscopy to see if Donovan bodies can be found which are present in ulcerative inguinal granuloma Because of the unfortunate ambiguity between these two conditions mentioned, the various names applied to them have intentionally not been given in the text Confusion and ambiguous nomenclature has undoubtedly arisen because of the similarity of the two conditions clinically

In male patients suffering from lymphogranuloma inguinale the presence of "bridges of skin" may not be seen so frequently about the ulcerated areas as in female patients with this condition The presence of bridges of skin about the external genitalia or the areas of secondary ulceration is very characteristic. The observation of this sign is a more useful method of clinical diagnosis than the Frei

Whereas malignant disease may occur at any age, most of the cases seen personally have been in men in their early thirties The grade of malignancy does not appear to be high, but the serious nature of the condition necessitates early radical amputation of the penis and excision of inguinal glands with in addition resetting of the urethra into the perineum Fig 83 *shows a photograph of a patient for* which this operation was carried out some years earlier There was no apparent recurrence of the disease The diagnosis was confirmed by microscopic section of the tissue removed The patient was seen for several years afterwards as he required periodic dilatations of the perineal urethra It was not unduly difficult to pass straight sounds into the bladder An operation of this nature may be associated with marked psychological disturbance in males under the age of 45 years, particularly in communities where great emphasis is laid on the importance of producing children On rare occasions unusual tumour formations may be found about the urethra Cases of rhinosporidium have been reported from India Considering the unusual pathology which is occasionally encountered, particularly *in the tropics, it is recommended that any tumour tissue removed at* operation should be submitted for section and microscopic diagnosis

INFLAMMATION OF LOWER GENITO-URINARY TRACT

Having given some consideration to the venereal diseases which have associated with them a primary genital sore of some sort, it is now necessary to consider diseases of the urethra Some of these conditions are associated with venereal disease while others are not Male children who are uncircumcised suffer from repeated attacks of posthitis or inflammation of the prepuce A degree of congenital phimosis is aggravated by chronic inflammation due to ammoniacal *decomposition of urine which occurs locally When inflammation is present,* local cleansing of the prepuce is difficult and painful Circumcision in infancy has obvious advantages in this respect The matter of circumcision as seen in the tropics will be dealt with in Chapter 12

In a certain number of male adults, particularly those of European origin, living in the tropics, there is a marked tendency to excessive sweating of the palms of the hands and soles of the feet These individuals frequently also exhibit an excess of secretion within the sac of the prepuce if they are uncircumcised Chronic balanitis occurs and a degree of leukoplakia develops The condition is very uncomfortable and not devoid of danger with the possible risk of late development of malignant disease The condition is most suitably treated by circumcision There is no evidence whatever that the condition is in any way of venereal origin Reference to this condition has not been found in the textbooks on genito-urinary diseases The condition has been personally noted only in European residents in tropical climates

Whereas the majority of cases of urethral discharge are of venereal origin, being due principally to Neisserean infection, cases are seen occasionally with a purulent urethral infection affecting, apparently, *the navicular fossa of the urethra* only, and in these cases *Micrococcus catarrhalis* organisms may be found The condition is invariably associated with an acute coryza The same type of

as a means of cauterising condyloma acuminata, but treatment by this means is a very painful process The condylomata alone are touched with the substance applied on a sharpened match which has been dipped into the solution Great care must be taken to avoid the normal tissue which gets burned if touched with the oil Patients require strong sedatives following the use of podophyllin

Yu,[5] discussing the treatment of condyloma acuminata, recommended oil of *Brucea javonica*, 15 per cent in tinct benz co, as a local application This gives good results as a cautery and has the outstanding advantage over podophyllin that it is not unduly painful following application Repeated treatment may be necessary with either of these substances or any other form of cautery as following



FIG 83
Case of amputation of penis for malignant disease

removal of the first major mass of condylomata, minute new papillomata may develop at other nearby points Patients do not like having repeated anæsthetics, and under these circumstances any form of effective local application is more willingly accepted than treatment requiring repeated anæsthetics Local application of trichloracetic acid also gives very good results Acosta-Sison [6] comments on the use of triple sulphate cream applied twice a day for two to three weeks for condyloma acuminata—the results are considered to be excellent

Dealing with any form of ulceration of the external genitalia in patients in the tropics, it is necessary to exercise great caution lest malignant disease be overlooked in its early stages Carcinoma of the penis is very much more common particularly in uncircumcised subjects in the tropics than in uncircumcised male patients in temperate areas Helman comments on the very high incidence of carcinoma of the penis in male patients in South-west Africa The comparatively young age at which malignant disease of the penis may occur is very noticeable

untreated cases the membranous urethra becomes involved with infection of Cowper's glands, subsequently the prostate gland becomes involved From this site the infection spreads to the seminal vesicles and vas deferens, the epididymis becomes implicated later Neisserean infection does not appear to give rise to a characteristic cystitis Redness of the base of the bladder may be found over the trigone position and represent congestion due to infection in the prostate There is in some instances a blood-stream infection by the gonococcus and so complications anywhere in the body may be seen on rare occasions A proved case of death due to gonorrhœal endocarditis in a female child was seen on one occasion Meningitis is also occasionally noted but these complications are rare Gonorrhœal conjunctivitis and gonorrhœal proctitis are noted more frequently Complications are much less common since the introduction of penicillin in treatment Arthritis affecting several joints is seen and it should be noted that if a patient complains of more than one joint being painful, and one of these is the wrist, the condition is very likely to be due to gonorrhœa

The use of urethral irrigation has been abandoned in the treatment of gonorrhœa in favour of penicillin

Remembering the older methods of treatment by irrigation, cases may still be seen where patients produce a gross chemical urethritis due to the injudicious use of excessively strong lotions in an effort to prevent urethral infection Irritation produced in this way causes a profuse urethral discharge containing no gonococci Treatment of this condition is most suitably undertaken by the use of hot baths and alkaline sedative medicines, penicillin also helps In the initial stages of the condition morphia may be required to relieve the severe pain present These cases are better treated in hospital

Sulpha drugs in adequate doses will cure up to 90 per cent of cases of acute Neisserean infection In some cases drug resistance is developed and it would appear that resistant sulpha strains have been developed during the past twenty years, during which time the sulpha drugs have been used Because of this factor of drug resistance all patients with gonorrhœa should be treated with penicillin

Some authorities use liquid penicillin and give many doses, considering it most efficient Three hundred thousand units of penicillin is adequate to ensure cure Willcox [8] is of the opinion that this dose is sufficient to cure 90 per cent of the cases For practical purposes in the tropics it is personally considered that the most efficient method of management of these cases is to give one dose of 1 million units of penadur penicillin—long-acting type The blood level is as high as required and for as long as is necessary to cure any case which is treatable by penicillin There are very few complications ever seen with this preparation The tetracycline drugs—aureomycin, terramycin and chloromycetin all give excellent results in the treatment of gonorrhœa In the early stages of the infection the patients may be made much more comfortable by the use of an alkaline bromide mixture by mouth Ample fluids should also be taken by mouth during treatment The desirability of treating the person from whom the infection was contracted is obvious and the person should be traced if at all possible

A small number of cases are still seen which are apparently resistant to either sulpha or antibiotic treatment and in which intracellular Gram-negative diplococci

organism is found in the nasal discharge The urethral discharge comes on abruptly and clears up without any treatment, lasting for only three or four days On clinical examination it looks exactly like a gonorrhœal infection It has been seen on a few occasions in patients not exposed to any venereal infection A Neisserean infection does not clear up in this way without treatment The lack of concern on the part of the patient as to the possibility of the condition being of venereal origin substantiates the validity of the history

One of the first cases in which a urethral discharge was found to be due to a *Trichomonas vaginalis* infection, was in an adult male patient who, not having been exposed to the risk of venereal infection, insisted that the condition required further investigation On further examination there was no evidence of Neisserean infection, but *T vaginalis* organisms were detected This type of urethritis, though not common, is well known in the tropics The discharge, if not treated, may persist for many months The residual source of the infection is probably the prostate gland The condition is very treatable by large doses of mepacrine An alkaline mixture should be given while the mepacrine is being taken Alkali by mouth decreases the risk of gastritis and makes the urethritis less uncomfortable Using large doses of mepacrine, care must be exercised to watch for any evidence of toxicity It is necessary to take six tablets of mepacrine of 0 1 gm each daily for six days This is a very large dose of mepacrine and the patient's skin becomes stained a very marked yellow colour Patients taking such large doses of mepacrine are better treated in hospital, so that they can be observed carefully lest toxic signs develop, if this happens the drug must be stopped immediately The patients are liable to suffer from severe insomnia during the last three days of treatment and for several days after the cessation of treatment Sedatives are required in almost all cases to induce sleep at this stage

It is unwise to make a diagnosis of gonorrhœa in any case on clinical examination alone, because of the number of cases where no gonococci can be found in the urethral discharge It seems that in cases of Neisserean infection Gram-negative intracellular diplococci can be found quite easily in almost all cases at the early stage Where the condition becomes chronic very few of the leucocytes contain intracellular germs, though extracellular diplococci may be seen Extracellular diplococci are suggestive of gonorrhœal infection but this standard does not come up to the criterion of diagnosis required for confirmation of the condition In some cases of gross urethral discharge diplococci, either intracellular or extracellular, cannot be found and so the term " non-specific urethritis " has been evolved In this condition, sometimes called Ritter's disease, there is a tendency for the patient *to develop arthritis and conjunctivitis The condition is difficult to cure and* it may go on for several months Neisserean infection is still the commonest cause of urethral discharge in male adults in Africa Dysuria is noted about five days after exposure to venereal infection, two days later there is a frank purulent urethral discharge The incubation period is therefore said to be five to seven days In some instances it may be much longer—up to two weeks

With an initial infection of the anterior urethra, the para-urethral glands become infected These glands are sometimes termed " the glands of Littre " In spite of the frequent passage of urine the infection is maintained and ascends In

advanced cases of urinary obstruction, the method of "try and see" would appear permissible There is considerable difficulty in appreciating the direction of force exerted by the point of a sound which is pointing in a direction almost at right angles to that in which the force is applied at the handle Most doctors endeavour to use the sound which they are presented with on arrival at any hospital, for they have not decided which they find best

Very few hospitals have a set of Powell's straight urethral sounds It would be a great advantage if these were more freely available Those who want to learn how to pass sounds could, with advantage, start by using these straight sounds Straight sounds very seldom damage the urethra and in very few cases is blood noted to come from the urinary meatus following their use The force exerted at the point is in the exact line in which it is applied, the sound being straight *This is contrary to the experience of those who have used curved sounds alone* With care, patience and practice, straight sounds can be passed through a posterior urethral stricture into the bladder much more easily and with less damage to the urethra than is the case with any form of curved sound The length of a Powell's sound is approximately six inches, including the handle With the patient in the horizontal position on the table, it is necessary to put the whole length of the sound into the patient's urethra with the penis in the flaccid state before the tip of the sound enters the bladder With the patient in the horizontal position on the table, it is necessary to depress the handle of the sound as low as possible, to the level of the table, to make it penetrate the lumen of the prostatic urethra As the curves of the urethra do not constitute a serious barrier to the passage of a straight cysto-urethroscope, so too there should be no serious difficulty in passing a Powell's straight sound into the bladder These straight sounds are designed for use primarily in cases of anterior urethral stricture, but are excellent for use in dilatation of urethral strictures in any part of the urethra If on passing [illegible] rethra, [illegible] nal [illegible] ent more proximally placed

The use of local anæsthetic Zylocain in the urethra is some help in cases where sounds have to be passed Sedatives given to the patient while lying down before the sounds are passed are more helpful Capsules of Carbrital—two given half an hour before the passage of the sounds—are helpful These make the patient *sleepy*, but he remains quite co-operative An alternative sedative which is excellent is 100 mg of intravenous pethidine If strong sedatives are given for the passage of sounds, it is desirable to keep the patient in hospital afterwards for not less than eight hours and preferably overnight In some cases where a stricture [illegible] anæsthetic [illegible] e [illegible] on markedly The passage of sounds is greatly facilitated by the use of jelly lubricants *rather than sterile* liquid paraffin as commonly used

Clutton's urethral sounds have a short curve at the distal end There is a gradual increase in the calibre of the shaft of the instrument from the tip to the

are found In these cases there may be some occasion to use the method of hyperthermia This method was introduced several years before the introduction of the sulpha drugs, following the observation that gonorrhœa was noted to clear up spontaneously following lobar pneumonia, where the temperature usually remained above 103° F for five to seven days Hyperthermia can be induced clinically as a controlled procedure by the intravenous injection of T A B vaccine This method has been used personally on several occasions with success Treatment is given in hospital A half-hourly temperature and pulse chart is kept during treatment The reaction varies from one patient to another, so small doses should be given to start the treatment The patient is given five doses (one daily) intravenously The amounts given are 3 minims, next day 5 minims, the next 7 minims and the final dose 9 minims The object of the treatment is to keep the temperature up to 104° F for ninety-six hours if possible If the temperature reaches 105° F the patient needs to be sponged down The treatment is uncomfortable as it produces severe headache, but it is effective It has a limited use particularly in cases with joint involvement where other methods fail No accidents have been encountered using this method on occasions, but it is not entirely devoid of danger, so vigilance and caution are necessary where it is employed

In spite of the availability of treatment in most places in recent years, neglected cases are still seen with serious late complications The sequence of events with Neisserean infection in untreated cases is acute urethritis becoming chronic, paraurethral gland involvement, urethral stricture formation due to *secondary infection, derangement of the blood supply of the urinary tract proximal* to the stricture, spread of secondary infection, paraurethral abscess formation and ultimately rupture of the abscess into the soft tissues, and finally urinary fistula formation The fistulæ are seen about the scrotum and perineum Behind the stricture there is evidence of back pressure in the urinary tract The bladder hypertrophies and ureters dilate The upper urinary tract becomes infected, with all its attendant risks

The matter of dealing with urethral strictures in the tropics is a most important one There are many points which it is essential to become familiar with Apart from the initial instruction given to students and house doctors in hospitals, it is necessary to develop skill in the method of passage of the instruments

Much more severe strictures are seen in the tropics than are encountered in temperate areas Practice is necessary to become skilful in these methods Doctors working in the tropics are constantly faced with situations which are never seen in temperate climates and concerning which they can find no information or help from the standard textbooks on genito-urinary diseases Having personally seen practically all complications which can possibly occur in cases of urethral obstruction, some comments will be given from personal experience These opinions may differ greatly from the standard teaching on the subject, but there is no advantage gained by saying what everybody else says, if in actual practice you do, as a result of your experience, something different There is no disadvantage in being criticised a little adversely for unorthodoxy Being acquainted with and having tried the standard methods, which are in many cases not suitable for

of the handle If there is any doubt whether a false passage has been entered, the sound should be withdrawn slowly for an inch or two, noting carefully while it is being withdrawn whether the handle again gives an abrupt jump as the sound leaves the false passage, for it should not do so A sound which has gone through a stricture into the bladder may have to be withdrawn with some degree of force, gently and uniformly applied The stricture grips the sound often quite tightly

If there is any difficulty in passing a sound it is often very helpful to pass it as far as it will go with ease and then put the index finger of the free hand into the rectum to the position of the prostate and with the finger in position advance the sound with carefully controlled wrist movement, with the elbow fixed The assistant can help by holding the penis on the shaft of the sound introduced It should be possible to feel the point of the sound close to the tip of the index finger *going along the urethra until it enters the bladder* If at any point the sense of touch on the left index finger in the rectum at the point of the sound becomes less distinct, it is likely that the sound has left the urethra and entered a false passage *It is excellent practice to pass a sound using one of the Powell's type* initially to get the sense of touch and the knowledge of the particular feeling encountered as each part of the urethra is entered If the point of a sound of any type is kept strictly in the middle line, as judged by the position of the handle, it seldom enters a false passage or does any harm If the point of a sound does enter a false passage it invariably goes off the straight line and the handle of the sound tilts from the horizontal

In some cases in spite of infinite patience it may not be possible to get a sound through the prostatic urethra because of a posterior urethral stricture In these cases it is advisable to use a middle-sized sound, not one of very small size, and to feel the tip of the instrument at the base of the prostate with the finger in the rectum Under these circumstances, if there is no doubt that the point of the sound has gone through the membranous urethra, and is at the apex of the prostate, *force can be used with reasonable safety to dilate a posterior stricture* Marked force should not be used until it is quite certain that the point of the sound is in the membranous urethra The best method of knowing that you have *the sound within the cavity of the bladder correctly*, is to put a clean hand on the patient's lower abdomen and while steadying the lower abdomen by gentle pressure, depress the handle of the sound so that the point is projected upwards and then rotating the sound gently, feeling for the corrugations produced by the trabeculæ of the bladder (Fig 84) The feeling is very characteristic and is somewhat comparable to that produced by running the point of a finger over the volar surface of the fingers of the other hand There is no doubt by this method that the sound is in the bladder If the point of the sound is not in the bladder, but in a false passage at the back or side of the bladder and a lateral rotation movement is made a " smooth feeling " without trabeculation sensation is noted It is satisfying to realise that *after sounds have been passed with some difficulty*, the instrument has definitely entered the bladder safely and without any doubt at all If bleeding occurs following the passage of urethral sounds, the patient should be kept in hospital for twenty-four hours for observation This may be considered unnecessary in all cases, but it is a safe rule

handle These instruments are very useful and are less likely to cause damage to the urethra than other forms of curved sounds Lister's sounds are made with an ovoid tip at the apex of the instrument The curved part of a Lister's sound corresponds to part of the arc of a 4 in diameter circle Lister's sounds, particularly the small sizes, appear to cause more damage to the urethra by entering into false passages than any other type of sound The frequency with which bleeding is seen following their use suggests that they are very liable to produce trauma of the urethra inadvertently Large sounds are much less likely to damage the urethra than are small sounds It is therefore desirable initially to pass a sound of a medium-large size In some cases where a stricture is suspected the medium-large sound will enter the bladder without any difficulty at all This may be quite unexpected and if this is found to be the case the patient almost invariably is found to be suffering from some abnormality of the prostate gland Prostatitis is usual in these cases The patient is frequently found to have an empty bladder and be suffering from a basal cystitis This produces strangury, a constant desire to pass urine when there is little or no urine in the bladder Following straining a small amount of urine is passed and he believes that there is some urinary obstruction and he " cannot pass urine," when in actual fact there is no obstruction in the urethra, but no more urine in the bladder to pass If a urethral stricture is present firm gentle pressure with a medium sized sound may dilate the stricture considerably even though it does not pass through the stricture completely It is advised that sounds of " decreasing calibre " should be introduced from the size initially tried, even though only a small advance is achieved with each sound, rather than that a very small sound should be tried initially, and so working towards the larger sizes By using this method it will be found that the stricture is dilated a little by each of the sounds and ultimately one which just penetrates the lumen of the stricture is found When one sound passes beyond the stricture into the bladder, progressively larger sizes can then be used more safely When passing sounds the elbow should be supported on the table, the patient's thigh, or on the doctor's own crest of ilium Pressure should be exerted in a well controlled manner using " wrist movement " rather than pushing from the shoulder If shoulder force is used the stricture may give way suddenly and the point of the sound be advanced rapidly damaging the urethra proximal to the stricture, or the bladder itself may be perforated Either of these accidents is very serious indeed

The question is often asked by those learning to deal with these cases as to " How hard should you push ? " and " How do you know when you are in the bladder ? " It is obviously necessary to push sufficiently hard to get the sound to go through the stricture, but with the passage of the sound there must be that sense that the sound is going through the course of the urethra even if a stricture is present If the point of a sound goes through a stricture and remains in the urethra and so into the bladder, it may require quite firm pressure depending on the tightness of the stricture and the size of the sound, but there should be a sense of touch about the handle of the sound which indicates that the sound has made no abrupt turning The sound should pass through a gentle curve with a sliding movement If the point of a sound goes through the wall of the urethra into a " false passage " there is almost invariably a sense of an " abrupt dip " at the position

it was before the attempted passage of the sounds If an impassable urethral stricture is encountered following attempted soundings under general anæsthesia, it may be necessary to undertake a Wheelhouse urethrotomy, dividing the stricture *surgically by the open method through* the perineum A preliminary suprapubic cystotomy is advisable in these cases

Prostatitis may be caused by any form of urinary infection Gonorrhœal infections may be encountered Coliform infections are also seen, while in some cases mixed infections are found In *one case where there was a chronic prostatitis* present, with fistula formation, some tissue was removed with a transurethral resectoscope, and on section of the tissue it was found that a tuberculous infection of the prostate was present This finding was unexpected, as genito-urinary tuberculous infection is not very common in West Africa With the use of penicillin, chronic prostatitis is being seen much less frequently than in the past Prostatitis gives rise to chronic dysuria and pain about the perineum The prostate is tender on palpation per rectum and in some cases a prostatic abscess may be formed when a boggy œdematous swelling is noted per rectum If chronic prostatitis is present the base of the bladder looks very congested when seen on cystoscopic examination An infection in Cowper's glands can be detected by palpation of the gland with one finger in the rectum and the other on the skin of the perineum, the index finger and the thumb being used Marked local pain is experienced when the inflamed gland is palpated in this way Cystoscopy is contraindicated in presence of acute inflammatory conditions

The urine in chronic stricture cases is often heavily infected with mixed organisms and of an offensive odour The reaction in these cases is invariably alkaline *Bacillus coli* cystitis is usually associated with acid urine and the organisms can be found easily on microscopic examination The passage of gas per urethram plus a coliform bacillary infection in the urine is suggestive of an enterovesical fistula If the urine is acid and containing some pus cells but no germs are apparent, the case is likely to be one of tuberculous cystitis Tubercle bacilli are not found in large numbers and special methods may have to be employed to detect them Microscopy of centrifuged specimens may help and guinea pig injections can be undertaken in some of the main laboratories In all cases of chronic cystitis the patient should be cystoscoped if the attack does not clear up completely within four weeks of the start of treatment If cystoscopy is not undertaken the serious risk of malignant disease may be overlooked and what is thought to be a case of cystitis is neglected at a time when there is some chance of cure of the condition by surgery If this is not done the diagnosis is forced *upon the doctor* by the distress of the patient six or eight months later when it is obvious that the disease is far advanced Schistosomiasis must be constantly kept in mind in many parts of the tropics in investigation of any form of genito urinary disease

Stone formation may occur in any patient with a urinary infection, but it is much more common in some parts of the world than others Urinary calculus is rare in the indigenous population of most parts of Africa Fain and Falaise[10] report the frequency of vesical calculus in male children between 6 and 11 years of age in parts of the Belgian Congo (N E) but consider that the condition is

In patients with a marked urethral stricture, it is unwise to dilate them beyond the size of an 18 22 F instrument If a patient is dilated to this size he will certainly not suffer from any urinary obstruction Patients with severe strictures who have the urethra dilated to full size are very liable to post-operative complications—severe hæmorrhage, retention of urine and urethral inflammatory obstruction There is little advantage gained by dilating patients beyond the level of 18 22 F

The frequency of the passage of sounds must be judged on the merits of each case Frequent passage of sounds is considered very inadvisable If a sound of the size 18/22 F can be made to enter the bladder easily and fully, further dilatation should not be undertaken for one month If the sound again enters the bladder easily at one month, subsequent passage of sounds should be undertaken three months later If the sound again enters the bladder easily at

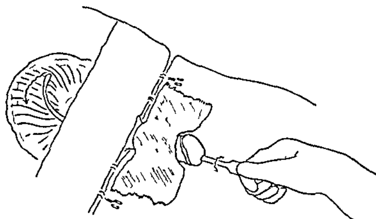


Fig 84
Diagram illustrating rotation test for entry of sound into bladder

this session, the next time of passage of sounds should be six months later and then annually on a fixed date that the patient can remember Mayne[9] has expressed the same opinion approximately regarding the frequency of passage of sounds and suggests that four to eight soundings in one year is all that is necessary Infrequent passage of sounds in stricture cases is contrary to the older teaching but in actual practice it works better If the sound does not enter the stricture fully at one sounding, the time interval for the next sounding must be reduced

If urine is obviously infected it is desirable to give the patient a course of sulpha drugs before the passage of the sounds If the patient has a marked stricture and sounds fail to pass, the patient should be admitted to hospital to see if urine can be passed during the next twenty four hours If this is not done the patient may travel a long distance from the hospital and be rushed back a day or two later in a poor condition and with an overfilled bladder The attempted passage of sounds may cause some urethral congestion and so precipitate urinary retention Filiform gum elastic bougies deteriorate very rapidly in hot climates so are seldom used In many cases, however, urine is passed without any greater difficulty than

it was *before the attempted passage of the sounds If an impassable urethral* stricture is encountered following attempted soundings under general anæsthesia, it may be necessary to undertake a Wheelhouse urethrotomy, dividing the stricture surgically by the open method through the perineum A preliminary suprapubic cystotomy is advisable in these cases

Prostatitis may be caused by any form of urinary infection Gonorrhœal infections may be encountered Coliform infections are also seen, while in some cases mixed infections are found In one case where there was a chronic prostatitis present, with fistula formation, some tissue was removed with a transurethral resectoscope, and on section of the tissue it was found that a tuberculous infection of the prostate was present This finding was unexpected, as genito urinary tuberculous infection is not very common in West Africa With the use of penicillin, chronic prostatitis is being seen much less frequently than in the past Prostatitis gives rise to chronic dysuria and pain about the perineum The prostate is tender on palpation per rectum and in some cases a prostatic abscess may be formed when a boggy œdematous swelling is noted per rectum If chronic prostatitis is present the base of the bladder looks very congested when seen on cystoscopic examination An infection in Cowper's glands can be detected by palpation of the gland with one finger in the rectum and the other on the skin of the perineum, the index finger and the thumb being used Marked local pain is experienced when the inflamed gland is palpated in this way Cystoscopy is *contraindicated in presence of acute inflammatory conditions*

The urine in chronic stricture cases is often heavily infected with mixed organisms and of an offensive odour The reaction in these cases is invariably alkaline *Bacillus coli* cystitis is usually associated with acid urine and the organisms can be found easily on microscopic examination The passage of gas per urethram plus a coliform bacillary infection in the urine is suggestive of an enterovesical fistula If the urine is acid and containing some pus cells but no germs are apparent, the case is likely to be one of tuberculous cystitis Tubercle bacilli are not found in large numbers and special methods may have to be employed to detect them Microscopy of centrifuged specimens may help and guinea pig injections can be undertaken in some of the main laboratories In all cases of chronic cystitis the patient should be cystoscoped if the attack does not clear up completely within four weeks of the start of treatment If cystoscopy is not *undertaken the serious risk of malignant disease may be overlooked and what is thought to be a case of cystitis is neglected at a time when there is some chance* of cure of the condition by surgery If this is not done the diagnosis is forced upon the doctor by the distress of the patient six or eight months later when it is obvious that the disease is far advanced Schistosomiasis must be constantly kept in mind in many parts of the tropics in investigation of any form of genito urinary disease

Stone formation may occur in any patient with a urinary infection, but it is much more common in some parts of the world than others Urinary calculus is rare in the indigenous population of most parts of Africa *Fain and Falaise*[10] report the frequency of vesical calculus in male children between 6 and 11 years of age in parts of the Belgian Congo (N E) but consider that the condition is

likely to be due to or associated with deficiency of vitamin A Most cases of vesical calculus seen in African patients have been in those who have had a suprapubic cystotomy operation performed some years earlier, no doubt associated with secondary bladder sepsis Urinary tract calculi are comparatively common in the Punjab and North-west Frontier areas of India (Das)[11]

A condition which is perplexing, but which is sometimes seen in the tropics is that of the male patient in the middle ranges of life who complains of urinary incontinence He leaks urine by day and night and is in a most distressed condition It is found on examination that he has no palpable distension of the bladder These patients adopt various unusual means to prevent the urinary leakage soiling their clothes, a constricting band may be placed tightly round the penis Cases have been seen where a spigot has been forced into the anterior urinary meatus and tied in position In some instances the patient allows the urine to collect in a wide-mouthed bottle or jar suspended from the waist and placed beneath the penis

For many years the true nature and cause of the condition was not well appreciated personally and the cause was thought to be a lack of sensitivity of the urethra in the prostatic area, with a disturbance of the mechanism of micturition Later, however, it became clear that the cause of this distressing condition was a chronic infection giving rise to bladder contraction or probably more properly termed a failure of dilatation almost to the extent of complete obliteration, there being an extensive interstitial cystitis present Any form of chronic infection may be causative of the condition Schistosomiasis with secondary infection, both being of long duration, is the most likely in many parts of the tropics It is suggested that where this condition of interstitial cystitis is encountered the bladder capacity should be tested by filling and emptying with catheter and small funnel, to see how much it holds Measuring the volume in this way is equally as good as performing a cystogram and is a very practical method in country stations where X-ray facilities are not available If there is no expansile bladder remaining in a functioning state to hold the urine, it is necessary to construct one If the bladder will not expand at all the patient is in a position comparable to a person with a uretero-cutaneous anastomosis, leaking all the time into a bottle, with no physiological reservoir present However, he has the advantage that there is a urethral sphincter mechanism still present

The method of treatment in these cases is initially to give the patient a course of sulpha drugs and follow this with streptomycin or chloramphenicol If any schistosome ova are present this condition should also be treated When the case is as clean as can reasonably be expected, a loop of ileum should be isolated on its mesentery in a suitable position and anastomosed to the vault of the bladder, such as it is The continuity of the bowel is reconstructed, one end of the isolated loop of ileum closed and the other anastomosed to an opening made in the vault of the bladder This form of ileocystoplasty allows the patient to accumulate 3 to 6 oz of urine before he is compelled to evacuate it He evacuates the urine by raising the intra-abdominal pressure This method has been used personally with satisfaction and is probably the easiest procedure

Ferris[12] describes enlarging the bladder with a segment of the ileum but

by a different technique A segment of ileum is isolated and opened on the antimesenteric border, thus giving rise to a sheet of ileum about 3 in by 3 in, depending on the length considered most suitable The top of the bladder is then widely opened and the sheet of ileum sutured on to the edges using mucous membrane to mucous membrane junction technique In this way virtually a new elastic dome is formed for the organ This method would appear to produce a new urinary reservoir approximating closely to the normal, though it might be technically a more difficult operation Not having tried it personally it cannot be commented upon further, but it would seem to be a sound procedure and worthy of consideration as a form of surgical treatment for this most distressing condition Temporary urethral catheter drainage of the bladder is required during early convalescence

URINARY TRACT INVESTIGATION

The apparent incidence of any disease in a community depends to a large extent on the facilities available for diagnosing the condition in question It is essential to detect some concrete evidence which indicates the presence of a disease without any doubt This evidence may be the culture of some characteristic organism, from the blood, urine, or stool, the microscopic detection of parasitic ova, such as those of the various helminthic infections, or the characteristic appearance of tissues as noted through various endoscopic instruments In some instances the X-ray appearances of opaque shadows are characteristic of certain conditions Physical and chemical changes noted in urine may be sufficient to indicate the presence of certain diseases In some cases a combination of findings may be pathognomonic and a fair conclusion can be drawn as to the diagnosis of the condition from which the patient is suffering The microscope is ultimately one of the most important instruments in diagnosis of tropical conditions this is less so with diseases in temperate areas of the world

Complicated apparatus is necessary in many instances for the examination of deep-seated structures This applies particularly to some diseases affecting the bronchi, the œsophagus, the rectosigmoid areas of the large bowel and the urinary tract Without such apparatus it may be extremely difficult to arrive at a precise diagnosis and in the absence of such equipment a false impression may be gained as to the real incidence of disease affecting deep-seated structures

In many parts of the tropical world the facilities available for investigating disease are poor In the main towns, which are more highly organised, there is in many instances a medical service which is highly developed In these centres investigation of genito-urinary cases can be undertaken with reasonable efficiency The standard books on urology can be consulted with advantage, as the methods of investigation suggested can usually be carried out In country stations, however, the situation is quite different Specialised instruments are often not available or are very limited There may be no main town electricity supply and X-ray apparatus is not installed and laboratory facilities are inadequate to undertake the necessary tests which are indicated for the detection of many conditions In these adverse circumstances methods must be resorted to which are simple,

likely to be due to or associated with deficiency of vitamin A Most cases of vesical calculus seen in African patients have been in those who have had a suprapubic cystotomy operation performed some years earlier, no doubt associated with secondary bladder sepsis Urinary tract calculi are comparatively common in the Punjab and North-west Frontier areas of India (Das) [11]

A condition which is perplexing, but which is sometimes seen in the tropics is that of the male patient in the middle ranges of life who complains of urinary incontinence He leaks urine by day and night and is in a most distressed condition It is found on examination that he has no palpable distension of the bladder These patients adopt various unusual means to prevent the urinary leakage soiling their clothes, a constricting band may be placed tightly round the penis Cases have been seen where a spigot has been forced into the anterior urinary meatus and tied in position In some instances the patient allows the urine to collect in a wide-mouthed bottle or jar suspended from the waist and placed beneath the penis

For many years the true nature and cause of the condition was not well appreciated personally and the cause was thought to be a lack of sensitivity of the urethra in the prostatic area, with a disturbance of the mechanism of micturition Later, however, it became clear that the cause of this distressing condition was a chronic infection giving rise to bladder contraction or probably more properly termed a failure of dilatation almost to the extent of complete obliteration, there being an extensive interstitial cystitis present Any form of chronic infection may be causative of the condition Schistosomiasis with secondary infection, both being of long duration, is the most likely in many parts of the tropics It is suggested that where this condition of interstitial cystitis is encountered the bladder capacity should be tested by filling and emptying with catheter and small funnel, to see how much it holds Measuring the volume in this way is equally as good as performing a cystogram and is a very practical method in country stations where X-ray facilities are not available If there is no expansile bladder remaining in a functioning state to hold the urine, it is necessary to construct one If the bladder will not expand at all the patient is in a position comparable to a person with a uretero-cutaneous anastomosis, leaking all the time into a bottle, with no physiological reservoir present However, he has the advantage that there is a urethral sphincter mechanism still present

The method of treatment in these cases is initially to give the patient a course of sulpha drugs and follow this with streptomycin or chloramphenicol If any schistosome ova are present this condition should also be treated When the case is as clean as can reasonably be expected, a loop of ileum should be isolated on its mesentery in a suitable position and anastomosed to the vault of the bladder, such as it is The continuity of the bowel is reconstructed, one end of the isolated loop of ileum closed and the other anastomosed to an opening made in the vault of the bladder This form of ileocystoplasty allows the patient to accumulate 3 to 6 oz of urine before he is compelled to evacuate it He evacuates the urine by raising the intra abdominal pressure This method has been used personally with satisfaction and is probably the easiest procedure

Ferris [12] describes enlarging the bladder with a segment of the ileum but

bimanual examination, one finger being in the rectum while the fingers of the other hand are pressed in above the pubis

A carcinoma of the bladder, at the advanced stage, can frequently also be felt on bimanual examination at the time the patient presents himself for treatment Many cases come to hospital for the first time at a late stage of the disease, but a finding of this sort in the tropics is very common An enlarged ureter cannot be felt though the abdominal wall In some cases a large hydronephrosis is easily palpable through the anterior abdominal wall In one instance a patient was seen with a hydronephrosis which gave rise to a degree of swelling within the abdomen sufficient to simulate an ascitic effusion with a fluid thrill Such a finding is unusual and certainly seldom seen in Europe, but the amount of advanced pathology encountered in some parts of the tropics is very high If in a patient with retention of urine a rubber catheter can be passed easily, the cause of the retention is almost always an enlarged middle lobe of prostate in elderly male patients but urethral sphincter spasm in a young man The spasm is secondary to early urethral inflammation, or an attack of prostatitis The normal bladder capacity may be considered to be 15 oz and if the capacity is reduced to as low as 8 oz it is suggestive of a chronic inflammatory condition being present The bladder capacity may be very low in late cases of schistosomiasis associated with gross infection In most cases of carcinoma of the bladder the capacity is also reduced as the growth interferes with the elasticity of its wall

An X-ray photograph of the bladder should not be neglected in cases of bladder pain, if the apparatus is available An ovoid shadow may be seen indicating a deposition of calcium in the bladder wall in old-standing cases of schistosomiasis In cases where this is seen the ova can seldom be found in the urine, the disease being now quiescent With straight X-ray photography vesical calculi are easily detected A cystogram is sometimes useful using 5 per cent sodium iodide as opaque medium If X-ray apparatus is not available and the patient complains of symptoms suggestive of vesical calculus the easiest way to confirm the presence of the condition is to pass a urethral sound into the bladder and rotate it so that all parts of the bladder are palpated If a stone is present a very characteristic feeling is detected when the sound touches the stone Primary urinary calculi, without infection in the urinary tract, are seen much less frequently in African patients than in Europeans In almost all cases stone formation in African patients is secondary to infection in the urinary tract Most of the cases seen have been in adult male patients who have had an earlier suprapubic cystotomy operation for the relief of urinary retention, due to an impassable stricture of the urethra

If a urethral stricture is suspected the diagnosis can be confirmed or refuted by the passage of a metal urethral sound Most urethral strictures are noted following untreated urethritis, but a small number may be of traumatic origin following urethral injury

Endoscopic instruments for the examination of the urethra and the bladder should be available in all country stations These instruments can be used with dry-cell batteries to supply the illumination It is necessary to have a mains electricity supply if any form of endoscopic diathermy is to be employed for

reasonably accurate and which can be carried out safely with very little specialised equipment It is important to examine the urine for organisms, blood cells—red and white—as well as renal casts of kidney tubules Unusual crystals may be found and schistosome ova detected in areas where bilharzia is known to exist Some important features which must be looked for in estimating disease in the urinary tract are abnormalities in appearance of urinary tract surfaces through endoscopic instruments

An indication of renal function can be gained by the excretion of indigo-carmine solution through the kidneys, as the dye shows on inspection of the ureteric orifices through the cystoscope Measurement of residual urine gives useful information The detection of bladder capacity is important as indicating the likelihood of any chronic inflammatory condition In the case of malignant bladder tumours the bladder capacity is usually reduced A serial estimation of the specific gravity of successive specimens of urine passed during the day is very valuable indeed in estimating renal function Many of these methods suggested may be considered old fashioned and may not be found in the newer textbooks on urology, but they have the merit of being simple to carry out If the results are interpreted cautiously they frequently lead to a very accurate diagnosis, which without them is not possible

The injection of phenolsulphonphthalein (P S P) is also useful as an excretory test, but it is necessary to have a colorimeter to read the result indicating the percentage excretion at various time intervals Other tests which give an indication of general health can also be used, though their inferences are only indirectly applicable to disease of the urinary system Differential blood counts are used which give corroborative evidence of disease A good history taken from the patient and an adequate physical examination of the various parts of the genito-urinary system are all essential For the information of those who are working with limited facilities some details are given in the extracts which will be found helpful in the investigation of urinary tract diseases These tests are omitted from the modern textbooks on urology as they have been replaced by newer ones The more recently introduced tests require, in almost all instances, complicated apparatus to perform and are not yet a practical proposition for use under the conditions in which many doctors have to work in the tropics

The external genitalia should be examined critically, looking for evidence of recent or old standing ulceration The presence of scars or thickening along the course of the urethra should be noted The finding of urethral discharge is important If a hard area can be detected along the course of the urethra in a male patient, suggestive of a urethral stricture, it can be assumed that the patient almost certainly is suffering from some degree of raised intravesical tension and this may be transmitted to the ureters and the kidney In the presence of high urinary tract tension, dilatation and infection of the upper urinary tract is very likely to be present In many of these cases the bladder can be felt to be much above the average size Following efforts to empty the bladder there is often sufficient residual urine to leave a palpable mass as large as the size of an average full bladder The prostate can be felt per rectum and in some cases where there is marked enlargement of the prostate this can be detected more accurately by

—8 and 10 A M, 12 noon, 2, 4, 6 and 8 P M The night urine is added to the morning specimen The specific gravity of each specimen is tested and recorded The urine specific gravity should reach 1,018 specific gravity or over on at least one occasion, without glycosuria being present, and there should be a difference of at least nine points between the highest and the lowest specific gravity readings This variation indicates that the kidneys are capable of increased excretion as required The volume of the urine passed during the night should not be above 400 c c if the kidneys are good, and excess fluid is not taken late in the evening Excess fluids passed during the night suggests poor renal function A lowering of the maximum specific gravity also indicates poor kidney function If there is very little variation in the specific gravity between the individual specimens of urine passed, much less than nine points, the kidneys are almost certainly not working well The test gives an indication of general renal function Tests carried out on urine passed per urethram give an indication of the general renal efficiency without any reference to the function of individual kidneys If individual kidneys are to be tested, it is necessary to collect urine from the individual kidneys separately through two ureteric catheters

To see if both kidneys are working, it is necessary either to undertake an X-ray examination following the intravenous injection of uroselectan or other comparable iodine preparation, or employ the indigo-carmine dye technique and cystoscopy In some stations there may be no X-ray apparatus and so one is obliged to resort to other methods In such instances the intravenous use of the dye indigo-carmine can be employed and the dye detected with the cystoscope as it is excreted by the kidneys and passed through the ureters into the bladder The patient is cystoscoped just before the dye is injected Indigo carmine is supplied in a 0 4 per cent solution (5 c c ampoules) The dye is injected intravenously This fluid is a very dark blue colour Intravenous injection is quite safe The patient being cystoscoped in the theatre has the dye injected intravenously The time of injection is noted If the renal function is good the dye starts to come through the ureters within three to five minutes of the injection The colour of the dye as excreted is blue and can be seen very easily If the dye is given intramuscularly it takes ten to fifteen minutes to appear through the ureters The intramuscular route may be used occasionally if the patient has veins which are difficult to enter The intravenous method is the more usual procedure If one kidney is not working at all due to complete destruction by disease or due to a "closed hydronephrosis," none of the dye comes from the corresponding ureter If the specific gravity test indicates that the overall renal function is good and an indigo-carmine dye test shows that only one kidney is excreting, it can be assumed that the patient is probably suffering from a closed hydronephrosis or pyonephrosis on one side, but is maintaining fair health with the other kidney which is functioning efficiently In these cases a nephrectomy can be undertaken with reasonable safety if it is considered necessary judging by the severity of the patient's symptoms Intravenous methylene blue 0 5 per cent solution has been used personally on a few occasions, but the results are not very reliable as with methylene blue the dye may, in some cases, be excreted in a colourless form, though in other patients it appears as a blue colour in the urine It is, therefore,

have no mains electricity supply, and if they are purchasing equipment they should consider getting apparatus which can be worked from batteries, as torch batteries, type U2, can be purchased in shops in almost any part of the tropical world The Gershom Thompson instrument or " cold punch prostatic resector " has an advantage over McCarthy's resectoscope in that the instrument is a form of

to arrest hæmorrhage of more than normal proportions by the use of diathermy coagulation, but hæmorrhage usually stops by itself without diathermy coagulation being necessary All stations require the ordinary right-angle viewing cystoscope A cystoscope with right-angle illumination and with carriers for ureteric catheters is most useful These two instruments, however, cannot be used for examination of the urethra A straight " fore-oblique " vision panendoscope is a most useful instrument With this apparatus the urethra can be examined as well as the base of the bladder The field of vision is straight in front of the instrument but the lower part only of the bladder can be visualised The field viewed cannot be altered by rotation of the instrument as with cystoscopes with a right-angle visual projection Many doctors with limited urological experience find this instrument much easier to use than the right-angle cystoscope when endeavouring to pass ureteric catheters into the ureteric orifices A panendoscope is recommended as well as a good viewing cystoscope of the standard angled field of vision variety, because of the fact that the urethra can be examined with the panendoscope and the ease with which ureteric catheters can be put into the ureters

In estimating renal function, the employment of the indigo-carmine dye test is most valuable and simple, the procedure being also very safe, no reactions have ever been noted following its use Cases may need to have their kidney efficiency estimated before a major surgical operation is undertaken The first test for kidney efficiency might be considered to be that of testing the urine for albumin This simplest of tests is very easy and very efficient, but it is often neglected before operations are undertaken It should be done in all cases Any patient with frank albumin in the urine is a very high surgical risk In these cases a general anæsthetic should be avoided if urgent procedures must be undertaken A patient's renal function may be very poor in spite of there being very little or no albumin apparent in the urine A most useful test for kidney function is that of Rosenthal The test is often termed the specific gravity test, it is very simple and gives information which is extremely valuable It can be carried out with only one piece of specialised apparatus, a ureometer, and is therefore suitable for any country station The test was introduced in 1914 and was used with satisfaction for many years until replaced by other tests which are much more complicated The method of undertaking the test is The patient is given normal diet and allowed to take fluids with his meals, but not between meals All specimens of urine are measured and total specimens bulked at two-hourly intervals

give rise to very severe pain The patient becomes restless, the pulse is often weak and sweating and vomiting frequently occur, particularly in European patients, but much less frequently in indigenous patients in the tropics If blood cells are found in the urine following an attack of this sort, renal colic is likely to be the cause of the condition Renal colic is frequently experienced following the passage of blood clot along the ureter from any disease in the kidney associated with bleeding from the kidney *The patient requires sedatives to relieve his* pain Atropin relieves ureteric spasm, and in that way stops the pain, while morphia dulls the patient's sensitivity A combination of morphia and atropin *is most helpful in the relief* of the condition Straight X-ray of the upper urinary tract often shows a stone present Small stones present are frequently not seen on X-ray examination, although they may be passed within forty-eight hours of the symptoms A small calculus in the lower end of the right ureter can simulate an attack of appendicitis, caution must therefore be exercised so that an unnecessary appendicectomy is not undertaken in error Congenital abnormalities of the ureters do not give rise to any symptoms *per se*

Preliminary preparation of the patient improves the standard of X-ray photography for renal calculus The patient should be given an aperient twelve hours before the examination, solid food should be withheld, and an enema given three hours before the pictures are taken to evacuate all gas present in the colon In examining the X-ray photographs the spine should be inspected closely to exclude the possibility of bone disease giving rise to the symptoms A tuberculous paraspinal abscess may give rise to symptoms not unlike a chronic *pyonephrosis In dealing with patients of African origin cases may* be seen where there is severe pain of recent origin in the lumbar area accompanied by hæmaturia, and in view of the fact that sickle cell disease crises may give rise to both of these findings, the possibility of this being the underlying cause of the symptoms must be remembered In cases of sickle cell crisis there is usually a marked constitutional disturbance, with fever, sweating and headache, there are usually pains down the limbs which are rather characteristic of the condition The necessary blood examination for the detection of sickle cells should be carried out Lund [13] noted cases of marked hæmaturia in patients of African origin following aerial flight, and this was accounted for by the precipitation of a sickle cell crisis induced by the degree of anoxæmia sustained in the flight The observations were made following flights in non-pressurised aircraft

Intravenous pyelography is a most useful method of detecting abnormalities in the upper urinary tract Any opaque shadow simulating a stone must be considered relative to the outline of the ureter and pelvis of the kidney A ureteric calculus seldom obstructs the ureter completely, though it may on occasions do so Partial obstruction gives rise to dilatation of the ureter above the calculus Complete suppression of urine sometimes occurs following the impaction of a calculus in one ureter alone In one such case there was a marked decrease in the output of urine for forty-eight hours followed by a complete suppression of urine Twelve hours later the patient was referred for surgical treatment The patient was drinking water very freely but no urine was being passed at all An X-ray photograph showed both kidney shadows A small stone was impacted in

not reliable and indigo-carmine should be employed if available Indigo-carmine ampoules keep for up to one year A limited supply of these ampoules lasts for a long time in a country station, where only a small number of renal investigations have to be undertaken in a year

If a patient's kidneys are working well, there is usually an excretion of not less than 1,500 c c of urine in twenty-four hours The specific gravity should reach anything up to 1,020 with no sugar being present If radiography is possible and uroselectan or other preparation is given intravenously, 15 to 20 c c depending on the size of the patient, it should be starting to appear in the pelvis or the kidney in sufficient concentration to cast a shadow within five minutes of being injected A film should be taken at five minutes after the injection, as this is useful as a form of renal efficiency test If the kidney is not functioning well there will not be sufficient uroselectan in the renal pelvis within five minutes to cast a shadow within this time If the renal function of one kidney is below 25 per cent efficiency, it will not concentrate the uroselectan sufficiently to cast any shadow at all In these cases only one kidney will show in the X-ray film If uroselectan is given to a patient whose blood urea is above 75 mg per cent the evacuation of the iodine compound is so slow that no shadow may be produced, or if any shadow does show it is very poor and weak

In undertaking uroselectan pyelograms by the intravenous route, it should be remembered that the clarity of the shadow depends on the concentration of the dye This depends again on two things—the renal efficiency and the amount of fluid going through the kidney in a fixed time Many indigenous patients in the tropics normally drink enormous quantities of water, and unless restrained from doing so before an intravenous pyelogram examination is performed the shadow cast will be very weak even in healthy persons, so that the pictures are practically useless When an intravenous pyelogram is undertaken the patient should be off fluids altogether for twelve hours before the examination This precaution greatly improves the intensity of the shadow cast and hence the pictures are of much greater value in deciphering abnormalities in shape and size of the renal pelvis If a patient's fluids are restricted before the examination and there is little or no shadow cast by the iodine preparation, it can be concluded that the blood urea is not less than 75 mg per cent In this way the uroselectan method can be used as an efficiency test Poor risk cases can be detected in this indirect method where a blood urea examination cannot be performed for lack of laboratory facilities, but where X-ray facilities are available

A retrograde pyelogram gives a better outline of the pelvis of the kidney than is usually obtained by the intravenous method Restricting the fluids by mouth before intravenous pyelography greatly improves the quality of the pictures Passage of ureteric catheters is easier through a panendoscope than through a cystoscope with angled vision and ureteric catheter elevators Sodium iodide 15 per cent solution can be used as the contrast medium

The phenolsulphonphthalein test (P S P) was introduced in 1910 as a means of detecting renal efficiency, bilateral or unilateral To carry out this test, which is very efficient and safe, it is necessary to have a supply of the drug and a colorimeter to estimate the percentage readings The drug is non-toxic and

or pyelo-nephritis Pyo-nephrosis also occurs, it usually becomes closed off in the later stages In some cases of dilatation of the ureter there is no apparent stricture at the lower end of the ureter [16] In all cases of dilatation in the upper urinary tract in patients living in areas where schistosomiasis of hæmatobium type is prevalent, this disease should be looked for In about 60 per cent of all cases with *Schistosoma hæmatobium* infections which come to post-mortem examination the ureters are found on section to contain ova The kidneys are infected with the ova in about 40 per cent of the cases With *S mansoni* infection the incidence of ureteric and renal involvement is below 5 per cent, it is thus much less serious relative to urinary tract complications

In patients with symptoms suggestive of upper urinary tract disease investigation should be undertaken by pyelography at any stage, the intravenous route being more desirable than the retrograde for the procedure It does not predispose to the spread of infection from the lower urinary tract Cystoscopy following the injection of intravenous indigo-carmine is also most useful By this method there is some indication given of the function of the kidney as judged by the time it takes for the dye to appear from the ureters after injection in the arm vein In some cases the dye comes from one ureter only, the other side shows no dye, presumably due to lack of function of the other kidney If a patient has intermittent symptoms on one side and he is found to have the kidney on that side not working, but the other kidney reasonably healthy, the diseased kidney is better removed Dilatation of the ureter, as noted by pyelography, suggests some form of dysfunction at the lower end of that structure This may be due to the presence of a calculus obstructing it, or a stricture within its lumen or a disturbance of neurogenic origin Neoplasms of the bladder involving the lower end of the ureter may also obstruct the ureter If there is obstruction in the lower urinary tract within the prostate or the urethra the hydronephrosis tends to be bilateral In female patients who suffer from post-partem vesicovaginal fistula there is very frequently a marked degree of hydro-ureter present Whether this is due to a state of chronic contraction of the residuum of the bladder or otherwise is not certain, but it is very commonly seen when transplantation of the ureters is being undertaken Some cases of marked dilatation of the ureter have a neurogenic basis associated with disease of the spinal cord Mega-ureter is sometimes seen in cases of megacolon in children Chronic dilatation of the ureter is quite often seen in female patients suffering from chronic tubo ovarian disease where the inflammatory condition is firmly adherent to the wall of the pelvis with the ureter being implicated in the inflammatory process

It is necessary to exercise great care in dealing with pelvic disease in female patients, lest the lower end of the ureters should be damaged at operation inadvertently A dilated ureter can normally not be felt through the abdominal wall In some cases a large hydronephrosis may be palpated and cases have been seen of sufficient dimensions to give rise to gross abdominal swelling with a fluid thrill Tumours of the ureters cannot be visualised directly and only a presumptive diagnosis may be made where there is continued unilateral hæmaturia as noted on cystoscopy and an absence of radiological evidence of tumour formation within the kidney Polycystic disease of the kidney is not a common condition Its

the upper third of the right ureter The ureter was approached extraperitoneally using a loin incision and the calculus removed through a small opening in the ureter The pelvis of the kidney was drained for forty-eight hours and during this time a prodigious quantity of urine was passed through the drainage tube The tube was then removed and the urine ceased to flow from the wound after the fourth day By this time urine was passed in the normal manner at regular intervals The patient made an uneventful recovery The patient was of Syrian nationality.

Whereas a diagnosis of chronic pyelitis may be made on clinical grounds, it cannot be considered proved unless infected urine is withdrawn from the ureter through a ureteric catheter A culture should be made to prove the identity of the causative organism *Cystoscopy should be avoided in acute pyelitis cases* Pyelitis is most frequently due to an ascending infection from below, but in some cases the infection is carried to the kidney via the blood stream There appears reasonable evidence to suggest that *Bacillus coli* and many other organisms are periodically passed through the kidney from the blood into the urinary tract, but these organisms normally do not grow and multiply in the pelvis of the kidney, so that a permanent infection is not maintained If a patient's resistance is lowered by any form of septicæmia, organisms may become localised and multiply in the urinary tract In the Far East the germs of melioidosis have been isolated from the urine with this condition

Honey and Gelfand[11] found the organisms of brucellosis in urine isolated from the pelvis of a kidney in a case of chronic pyelitis The patient was suffering from a chronic bone sinus of the leg and sternum In this case some calcification was noted in the peripheral parts of the parenchyma of the kidney Tuberculosis of the parenchyma of the kidney or of the calyces is not commonly seen in African patients in spite of the high rate of tuberculous pulmonary disease, this is rather surprising The pathology of brucellosis bears some similarity to that of tuberculosis It is of interest to note that amongst the various names applied to brucellosis in the past "Mediterranean tuberculosis" was at one time used in the absence of a precise knowledge of the cause of brucellosis This clinical error was based on the similarity of the manifestations of the two conditions which bear a slight resemblance If brucellosis is suspected or indicated by a positive skin test, the organisms may in some instances be isolated from the urinary tract

Pyelitis about the third month of pregnancy is not uncommon This is often associated with the physiological changes occurring within the pelvis which tend to relax the lower ends of the ureters, thus predisposing to an ascending infection In cases where there is gross infection of the upper urinary tract pus can be visualised com ng from the [illegible]

to th- [illegible]

dying as a result of urinary diseases were found in 37 per cent of the cases to be suffering from the late effects of schistosomiasis This disease ultimately kills the patients by infection of the upper urinary tract secondary to ureteric dysfunction In other instances fatalities occur as a result of liver complications or cardio-pulmonary implication With schistosomiasis the ureter becomes grossly dilated in some cases Ascending infection occurs, and resulting from this pyelitis

SUPRAPUBIC CYSTOTOMY

This operation is one which almost all doctors working in country stations in the tropics will certainly have to perform from time to time as an emergency procedure It is undertaken for relief of urinary obstruction in cases where urine cannot be evacuated through the urethra, due to impassable fibrous strictures or because of injuries of the urinary tract It is also required in cases of prostatic obstruction where, due to gross congestion, instruments cannot be passed into the bladder, or in patients in a pre-uræmic state with enlarged prostate who are unfit for a one-stage prostatectomy

The first record of this operation having been performed, as quoted by Thorek,[17] was given by Pierre Franco in A D 1560 in Lyons, France This route of entry into the bladder was adopted for the removal of a stone from the bladder of a child of 10 years, following failure to remove the calculus by the perineal route, which was the standard method The patient recovered Whereas this suprapubic operation is usually an emergency procedure, it is often required as a timed measure in cases of chronically enlarged prostate, where the patient is in poor general condition It is also used as required for the removal of stones from the bladder A direct suprapubic approach is employed for removal of basal bladder growths requiring extensive diathermy coagulation It is also employed in cases of para-urethral abscess with rupture into the soft tissues followed by extravasation of urine In recent years in England, perineal urethrotomy has been employed more frequently for urinary deviation in urinary extravasation cases

If the patient seeks advice because of scrotal urinary fistulæ, it is advisable in almost all cases to undertake a preliminary suprapubic cystotomy prior to dealing with the basic condition precipitating the fistula—a urethral stricture In undertaking plastic surgery on the urethra because of post-inflammatory defects or congenital abnormalities, results are poor if the urinary stream is not first deviated before the reparative surgery is undertaken In cases of epispadias of congenital origin the urethra does not open in the normal position but on the dorsal surface of the penis In extreme cases of hypospadias the opening of the urethra is in the ventral position or in the perineum Plastic surgery is necessary to remedy these defects In some cases a perineal cystotomy is recommended as a preliminary procedure To be deprived of normal urinary control is an offensive situation Suprapubic cystotomy should be considered in all circumstances as being a temporary expedient only and a preliminary to dealing with the basic condition making it necessary

The one condition in which suprapubic cystotomy is contraindicated is in cases of carcinoma of the prostate seen at a late stage In some instances a prostate may be enucleated and be followed by a satisfactory result, although on section of tissue early malignant changes are detected If there is clinical evidence that malignant changes have spread into the capsule of the prostate a total prostatectomy according to Millin's technique should be undertaken Following removal of the prostate with its capsule the neck of the bladder is joined to the urethra which is sectioned at the base of the prostate Cystoscopy is not of value as a means of detecting early malignancy of the prostate If on cystoscopy of a late case of

presence should be suspected in patients who have a palpable renal swelling and who have, on pyelographic examination, a characteristic shadow suggestive of multiple cystic spaces in the renal area Intermittent attacks of hæmaturia are characteristic of the condition These patients all show vascular hypertension They ultimately develop uræmic symptoms The prognosis is poor and if they do reach adult life they seldom attain the age of 50 years

The treatment of upper urinary tract infections is undertaken initially by the use of sulpha drugs If symptoms are not unduly severe a course of a soluble sulpha drug such as Gantrisan should be tried initially in full doses for ten days, and the patient instructed to take large amounts of fluids during the administration to avoid toxic complications This method is very safe and satisfactory in many cases Streptomycin is also useful in coliform infections It is also indicated in tuberculous conditions The antibiotic drugs should not be used in upper urinary tract infections without testing the sensitivity of the organisms to the particular antibiotic drug chosen, as it is necessary to give a prolonged course of these drugs which in themselves are not devoid of danger In a limited number of cases the disturbance of the intestinal bacterial flora predisposes to the overgrowth of certain bacteria such as *B pyocyaneus* which is quite dangerous in itself A condition of chronic diarrhœa may be induced which has associated with it a high death rate

It is necessary to exercise great caution before recommending a nephrectomy for any upper urinary tract abnormality

Perinephric abscess is a condition which is seldom seen in the tropics It is becoming less frequent since the introduction of the antibiotic drugs for the treatment of sepsis elsewhere in the body With a perinephric abscess there are signs and symptoms very like those of subphrenic abscess of hepatic origin—fever, malaise, leucocytosis, sweating and pyrexia and nausea Cases of subphrenic abscess usually have a raised diaphragm corresponding to the site of the abscess present, but in cases of perinephric abscess the signs may be very much the same and there is no alteration noted in the level of the diaphragm on X-ray examination The old rule of " pus somewhere, pus nowhere, pus under the diaphragm " is a very good one, but it is equally applicable to perinephric abscess as to subphrenic abscess In the circumstances the necessary differentiation may be made by an X ray photograph to estimate the level of the diaphragm If the dome of the diaphragm is not raised the signs and symptoms are more likely to be due to a perinephric abscess Obliteration of the psoas muscle shadow is very characteristic of perinephric abscess In these cases an exploratory opening should be made into the perinephric area through the lumbocostal angle The pus is thus approached by the extraperitoneal route The source of infection in a perinephric abscess may be from the kidney itself, where an abscess within the kidney ruptures through the capsule into the soft tissues In almost all cases seen personally, however, infection has been presumed to be of metastatic origin carried by the blood stream The kidney in such cases looks normal, and there is no indication of a leak of urine taking place following opening of the abscess With a perinephric abscess most frequently due to *Staphylococcus aureus* the condition usually settles down completely following drainage Enlargements of the kidney will be considered in another section

Preliminary suprapubic cystotomy, undertaken in an elderly patient for enlarged prostate causing urinary obstruction, should be located not less than 2 in above the symphysis pubis otherwise when the prostatectomy is being carried out, using the transvesical approach, it is difficult to get the isolated prostate through the wound as the space available is insufficient If the retention is due to an enlarged prostate it is seldom difficult to fill the bladder, as a rubber catheter can be passed in most cases and the bladder filled with saline from an attached bladder syringe The risk of damaging the peritoneal cavity is therefore small Damage to the peritoneal cavity is much more likely to occur in cases of urinary obstruction due to fibrous urethral stricture The greatest difficulty arises when there is an anterior urethral stricture present and this is impassable to instruments so that the bladder cannot be filled through a catheter passed via the urethra The patient may be complaining of very severe pain and inability to pass urine although his bladder is not very full The bladder may contain only 6 or 8 oz of urine, but this is insufficient to permit of a stab suprapubic cystotomy opening being undertaken With this quantity of fluid in the bladder the peritoneal cavity is inadequately taken up from the lower part of the back of the anterior abdominal wall The urethra cannot be traversed because of the congested impassable stricture and the patient is in a state of pain and distress It is advised in these circumstances, where a suprapubic cystotomy is essential, to undertake one or other of the following procedures

The patient is given a general anæsthetic and through a transverse suprapubic incision the bladder is approached under direct vision and the peritoneum pushed up so that it is not damaged when the bladder is opened This method is safe, but it necessitates a transverse incision of about 3 in long

The other procedure, which is considered more suitable, is to allow the bladder to fill by the normal excretion of urine to as large a size as the patient will stand and then send him to the theatre, but this is a slow and distressing experience for the patient In some cases the bladder can be distended to the umbilicus by this means and a stab suprapubic cystotomy then undertaken but in other cases the bladder is still not adequately distended to permit of a suprapubic cystotomy with a large trocar and cannula To accelerate the filling it is advised that the bladder be entered with a lumbar puncture needle just above the top of the pubis, a little fluid is withdrawn to ensure that the point of the needle is within the cavity of the bladder and then fill the bladder through the lumbar puncture needle, putting in an additional 10 to 15 oz of fluid through a bladder syringe and attachment By this method there may be a small leak back into the tissues about the suprapubic space, but this is unlikely to do any harm When the bladder is distended in this way to the level of the umbilicus suprapubic cystotomy can be undertaken quite safely through a small stab wound at the appropriate place If the incision is small no sutures are required A large trocar and cannula of the straight type is used or a Kidd s type may be employed, using the stab suprapubic method A de Pezzer catheter is inserted Patients in the tropics are much more comfortable when this method is used than where open operation is employed, the small wound being easier to dress at home

urinary channel, so permitting of passage of urine per urethram It may be necessary to repeat the operation at intervals If this is done the patient is much more comfortable and retains a fair degree of urinary control as opposed to having a permanently leaking suprapubic opening

If a urethral stricture develops slowly due to a low-grade inflammatory condition, infection and abscess formation proximal to the stricture is a usual occurrence The abscess ultimately ruptures into the soft tissues giving rise to a urinary fistula of the scrotum or perineum In this way the patient's urinary obstruction is relieved, his bladder discomfort is much reduced and his general health is better He has, however, the discomfort of leaking urine from the fistulous opening Because of the relatively high incidence of urethral stricture in male patients in the tropics, the necessity for emergency suprapubic cystotomy is much greater than in temperate climates

A suprapubic cystotomy should not be undertaken lightly or without due consideration of other possible means of relief of the urinary obstruction available, as it is not devoid of risk It may be possible to relieve the urinary retention if care and patience is exercised in an attempt to pass urethral instruments into the bladder by the normal urinary passage Such an attempt should be made with caution and care, before suprapubic cystotomy is undertaken In some cases the attempt may be successful If it is obvious that instruments will not enter the bladder without undue force being used, it is better not to proceed further as with the congested state of the urethral tissues damage can easily be inflicted on the urethra, which is to the detriment of the patient

In performing suprapubic cystotomy care must be exercised to keep the instrument extraperitoneal in position so that the peritoneal cavity is not injured The distance between the umbilicus and the top of the pubis varies greatly in different individuals, partly because of their height and also because the umbilicus is not in an absolutely fixed position It may be noted in cases of ectopia vesicæ that the position of the attachment of the umbilical cord is very close to the pubic bones and forms the uppermost part of the scar-like tissue which represents the everted bladder The precise number of inches above the top of the pubes which is the optimal position for the cystotomy cannot be considered a fixed measurement If the bladder is very full, reaching up to the position of a normally placed umbilicus, the lowermost point of reflection of the peritoneum from the bladder on to the anterior abdominal wall is about half way between the umbilicus and the top of the symphysis pubis A suprapubic cystotomy should therefore not be undertaken under any circumstances above a point half-way between these two points The half way mark is usually slightly higher than one can afford to go with safety One inch below this point is usually suitable if the bladder is well filled When a suprapubic cystotomy is undertaken granulation tissue is formed in the track and this prevents the bladder receding back into the pelvis after the cystotomy closes The peritoneal cavity does not descend below the level of the opening once the suprapubic opening has been made

soluble sulpha drugs to decrease the risk of ascending infection from the bladder to the upper urinary tract

If the peritoneal cavity is injured during suprapubic cystotomy, due to inadequate elevation of the peritoneum by insufficient filling of the bladder, there will be a leak of urine from the bladder into the peritoneal cavity and this condition is very serious If such an accident is suspected it is advised that 15 per cent sodium iodide solution be put through the catheter into the bladder and a cystogram X-ray photograph taken If 10 to 15 oz of this solution is put into the bladder through the catheter under slight tension and the peritoneal cavity is injured, some of the sodium iodide solution will leak out and show in an X-ray cystogram, the bladder shadow being not clear and discrete due to the spill of sodium iodide If the peritoneal cavity is injured an immediate laparotomy is indicated The bladder is emptied as far as possible and on opening the abdomen and seeing the state of the bladder from above, the catheter is removed if it goes through the peritoneal cavity, the bladder is repaired and the peritoneal cavity cleaned out with suction and swabs A new suprapubic cystotomy is then undertaken in a lower position under direct vision and the abdomen closed with a small pelvic drain inserted This is a serious complication with a high mortality rate if it is not recognised early and dealt with promptly If no X-ray apparatus is available, it is advised that a sterile saline solution be put into the bladder through the catheter and if more than 20 oz goes into the bladder without causing marked distension it can be assumed that the bladder is leaking due to injury The leak may be small so it is necessary to allow several minutes to see if the bladder, being full, decreases slowly in size The saline solution entering the peritoneal cavity will in itself not do any harm, as it is a sterile solution

The subject of urinary tract injuries of the non-operative type will be dealt with separately Whereas suprapubic cystotomy has many advantages in the relief of urgent urinary obstructions which cannot be dealt with through the urethra it carries the inevitable risk of sepsis within the bladder and a risk to the upper urinary tract It is necessary to take precautions against infection of this type by use of appropriate drugs

If patients who have had a suprapubic cystotomy operation performed many years before are observed carefully, it will be seen that the scar of the old operation descends considerably with time towards the pubis A cystotomy opening being well placed originally soon approximates to the pubic bones, and there is an obvious strong band of fibrous tissue placed between the back of the scar and the top of the pubis As the peritoneal cavity almost invariably becomes stuck to the uppermost edge of the suprapubic track and the suprapubic scar becomes pulled down towards the pubis with a lapse of time, it is unsafe to undertake a second suprapubic cystotomy above the original one for fear of entering the peritoneal cavity In these circumstances it is considered advisable that if a secondary suprapubic cystotomy becomes necessary on a patient with a lowly placed old stab suprapubic cystotomy scar, the second operation should be performed by the open method only using a low transverse incision A repeat suprapubic cystotomy undertaken by the stab method is not very safe Patients

In male patients under the age of 40 years, who suffer from an acute attack of retention of urine secondary to urethral stricture with superimposed congestion, urine, in many cases, is passed following morphia and atropine injection and a hot bath If the bladder can be emptied in this way the congestion often settles down sufficiently to permit of the passage of urethral sounds some hours later and so a suprapubic operation can be avoided If prior to acute retention the patient was passing urine moderately well, it is often possible to relieve the patient's congestion by the insertion of a lumbar puncture needle into the bladder suprapubically, allowing the urine to drain away for twelve hours, a long Southey's tube may also be used for this purpose if preferred A fine calibre rubber tube is attached to either of these instruments used for the paracentesis of the bladder to take the urine withdrawn to a receptacle After twelve hours' drainage by this method the lumbar puncture needle is removed and the passage of urethral instruments is attempted under anæsthesia If this is successful the patient is tided over the emergency without making a large suprapubic cystotomy Repeated lumbar puncture cystotomy is inadvisable as with this method there is a small amount of leakage into the soft tissues, and as this is confined to a deep tissue space the infection may spread If after one drainage by lumbar puncture needle the case cannot be relieved via the urethra a suprapubic cystotomy with insertion of a de Pezzer catheter should be performed

A suprapubic cystotomy is usually undertaken with the patient lying horizontal on the operating table while under a general anæsthetic, or local anæsthesia It seems to be of some advantage when undertaking this operation to put the table into the Trendelenburg tilt, this assists in raising the level of reflection of the peritoneum from the top of the bladder and off the back of the lower abdominal wall and thus prevents damaging it Adrenaline added to the local anæsthetic decreases the risk of hæmorrhage from the layers of the abdominal wall In cases of chronic urinary retention there is a small risk of post operative renal congestion with suppression of urine if the pressure within the bladder is released suddenly Whereas this is a theoretical possibility it has never been personally noted in actual surgical practice The risk in this respect seems to be small

An alternative method of entering the bladder in cases of anterior urethral stricture is by the employment of a Cock's puncture of the bladder via the perineum This has been found to be suitable in a small number of cases where an anterior urethral stricture is present with dilatation of the prostatic and posterior urethra behind the stricture This procedure is now seldom used but is a very satisfactory method in a limited number of cases The most suitable position for the puncture can be easily estimated by putting the index finger of the left hand in the rectum and feeling the dilated urethra at the apex of the prostate The trocar and cannula should be of sufficient size to permit the insertion of a No 8 catheter The catheter is sutured to the skin of the perineum Mention is made of the operation in Carson's *Operative Surgery* [18] The urethral stricture should be dealt with after one week's drainage of the bladder through the perineum With the stricture well dilated the perineal opening closes within a week or ten days Further urethral sounds must be passed periodically In all cases where a suprapubic cystotomy is undertaken the patient should be put on a course of

consideration as it is still so commonly seen in tropical surgical practice Figs 86, 87 and 88 show the condition In this type of gangrene the majority of cases



Fig 86
Case of Fournier s gangrene of scrotum



Fig 87
Fournier s gangrene following healing without skin grafting
Same case as Fig 86

show complete necrosis of the skin of the lower two thirds of the scrotum The skin of the penis is seldom affected though it may be so on rare occasions, as

should be given clear instructions following any operation on the urinary tract, where urethral obstruction has been dealt with, to attend periodically for inspection and examination Subsequent urethral dilatations are desirable in almost all cases and unless this is made clear to the patient he may neglect subsequent treatment and develop further urinary obstruction, not appreciating the necessity of further treatment

Keloid scar formation is fortunately not common in wounds following suprapubic cystotomy operations on male patients who may have a tendency to form them elsewhere

GANGRENE OF THE SCROTUM

Idiopathic gangrene of the scrotum is now seldom seen in non-tropical countries, but it is still comparatively common in the tropics The name of Fournier is associated with the condition because of the accurate original description which he gave of this clinical entity The disease was well known in France, as in other European countries, in the last century

There are several types of gangrene of the scrotum Localised necrosis of skin may follow injury, but this is not very common and the treatment is as for any wound—local cleaning, sutures and measures to prevent the spread of sepsis Localised gangrene of the skin may occur overlying the site of deeply placed sepsis, following operations on the testicle The condition is predisposed to by the operative trauma and the failure to obtain adequate hæmostasis, sepsis is an added factor In these cases evacuation of blood clot, and pus if present, is indicated and adequate drainage instituted The condition is comparable to an abscess, with involvement of the overlying skin, it should be treated accordingly Following operations for hydrocele on one side, gangrene of the skin is rare if hæmostasis is adequate and the operation field is free from sepsis Hydrocele is frequently bilateral and there may be marked thickening of the tissues If, in these circumstances, a bilateral hydrocele operation is undertaken in a patient in poor nutritional condition it is very likely to be followed by gangrene of the scrotum on one or both sides This is a very serious complication As a result of experience, and faulty judgment at times, it is considered unwise to operate on a hydrocele on both sides at the same operating session This complication of scrotal gangrene is most likely to occur when there is marked thickening of the coverings of the testicle

Gangrene of the skin of the penis and scrotum may occur in late and neglected cases of extravasation of urine Treatment consists in dealing with the condition by multiple incisions in the skin of the penis and scrotum, penetrating the fascial layer under which the urine is extravasated, and undertaking a suprapubic or perineal cystotomy for the deviation of the urinary stream The use of sulpha drugs and antibiotics is desirable to control the infection in the tissues The associated urethral stricture must later be dilated These conditions are all mentioned with a view to making some comparison between the clinical findings noted in the various forms of gangrene and those seen in cases of idiopathic or Fournier's gangrene of the scrotum This latter condition requires particular

of the world, it would appear that the cause is not essentially associated with any of the typical tropical diseases Cases of gangrene of the scrotum have been noted in Canada and thought possibly to be secondary complications of the tick *fever group of diseases of rickettsial origin* If the condition was in any way infective and linked to the tick diseases, it might be expected that several cases would occur in a district together, or that small epidemics of the condition might be seen This does not appear to be the case *Several cases of extensive gangrene* of the hand were noted during a short period in 1941 in a large coast town in West Africa These were thought likely to be of rickettsial origin

Patients suffering from gangrene of the scrotum usually come to hospital complaining of severe local pain about the scrotum of three or four days' duration There is discoloration of the skin with early necrosis and a thin serous discharge from the surface may be noted There is initially no evidence of gross pus formation as with staphylococcal conditions This clinical entity is much more suggestive of an erysipelas of the streptococcal type than a staphylococcal infection The local signs and symptoms are associated with a general constitutional disturbance The patient develops a *high temperature, headache, sweating, fast* pulse and painful groin glands The lower two-thirds of the scrotum is almost invariably affected The skin comes off in large masses during the next week or ten days, leaving the testicles completely exposed The testicles are usually normal in size and shape, they do not suggest that the disease is basically of testicular origin

Gregory[19] describes a recent case and suggests thrombosis of the scrotal arteries as being a possible and most likely cause of the condition, but it would appear difficult to see how thrombosis of any one artery of the scrotum could cause a bilateral, symmetrical condition That the several arteries supplying the scrotum from both sides should become thrombosed at the same time is most unlikely Considering the possible position in which vessels might be thrombosed with resultant gangrene, the following observations are relevant Having operated, over many years, on a large number of cases of elephantiasis of the scrotum of filarial origin, an opportunity has been afforded of seeing the distribution of the venous drainage of the scrotum The veins in this condition are enormously enlarged, but it is presumed that they are probably of the same anatomical distribution as might be expected *in a normal subject even though they are grossly* dilated It can be seen that there are many very large veins running up posteriorly *from the sides of the scrotum into the perineum ultimately to form* the internal pudendal veins

There is, however, in addition a very large and conspicuous median vein running up the centre of the posterior aspect of the scrotum as though coming from the presumed position of a scrotal septum It is placed more deeply in the scrotal tissues than the many other large lateral veins which are much nearer *their* respective sides It is significant to note that this large vein has no accompanying artery This vein runs close to the bulbous urethra This is the only vein that would appear to have a central distribution collecting its tributaries from both sides of the scrotum If this vein is thrombosed there might well be serious interference with the venous drainage of the posterior and inferior part of the

seen in Fig 88 The condition is seldom fatal, but invariably incapacitates the patient for three months, during this time the gangrenous skin sloughs off completely After separation of the devitalised skin there is granulation tissue formation and slow healing *In the absence of post-mortem examination it is* difficult, in any clinical condition, to ascertain the precise pathological changes which take place during the course of the disease Conclusions as to the precise nature of the condition are therefore speculative from clinical observations alone

Certain observations may be made as a result of cases seen and treated Fournier's gangrene of the scrotum occurs most often in patients who show no evidence of malnutrition, the patient's general condition appearing excellent at



FIG 88
Fournier s gangrene involving penis and scrotum Early stage

the time the disease starts The finding is unlike that seen in cases of gangrene of the cancrum oris type in children where the cheek or lips are involved, or that seen about the back of the head in children in an undernourished state Most of the cases of Fournier's gangrene have been in patients living in forest country where food supplies are good Patients with this type of gangrene do not have any form of urinary obstruction, nor does it cause any difficulty in passing urine Cases have not been noted to have any evidence of active disease about the urethra when seen with scrotal gangrene The disease does not follow urethral trauma following instrumentation for urinary obstruction The application of native medicine does not appear to be a precipitating factor in its production, though in a few cases patients have admitted that they have applied irritant medicines to the scrotum before coming to hospital The medicine applied did not appear to be a basic cause of the condition All cases seen have been in patients between 20 and 40 years of age It has not been seen in younger or older patients As cases of the condition occur in non-tropical countries as well as in tropical areas

the female breast In this structure localised gangrene occasionally occurs in the skin of the breast in the position beyond its maximum circumference. Fig 89 shows a case of this sort where the skin of the lower half of the breast beyond its maximum diameter sloughed off completely Gangrene of the skin occurred in this patient with mastitis after she had slept for several hours lying on the breast in the ventral position The case is instructive in this respect as there seems to be an additional mechanical factor influencing the distribution of the gangrene as well as the centrally placed infective thrombosis with œdema, as in cases of gangrene of the scrotum Although the site of vascular disturbance has not been



Fig 89
Gangrene of female breast skin of comparable orig n to Fourn er s gangrene

proved in cases of idiopathic scrotal gangrene, several workers have noted the presence of streptococci in the tissues on culture

In considering treatment, it can be said that cases are seldom seen until the patient exhibits obvious gangrene of the scrotal skin This skin inevitably sloughs off, as in the case of a third degree burn, leaving a raw granulating surface to heal The slough may be allowed to separate itself, it gives rise to an offensive smell and it takes two to three weeks to separate completely The process of separation can be accelerated with advantage by excision as in third degree burn cases Any drugs suitable for the treatment of streptococcal conditions are desirable and suitable—the sulpha drugs are excellent, penicillin is very popular Campbell[20] considered chloromycetin the drug of choice In the tropics where spirochætal infections with fusiform bacilli are commonly seen in any form of wet wounds, penicillin has the advantage of being therapeutically active against streptococci and spirochætes Penicillin is therefore very suitable for use in these cases in the

scrotum It seems possible that this vein may be the main pathway of return of blood from the lower half of the scrotum in male patients when they assume the sitting position wearing loose-fitting clothes, such as a cloth which is often worn by men in some parts of the tropical world While in the sitting position a pendulous scrotum rests on the seat on which the patient is sitting It can be noted that if an adult male patient sits unclothed on a chair with the thighs abducted and an ink mark is made on the scrotum at the position where the scrotal skin touches the surface of the seat, this mark corresponds accurately to the position below which the gangrene occurs in Fournier's disease The distribution of the gangrene is so constant that there appears to be some evidence to suggest that the angulation of the skin at the position where the scrotal skin touches the seat may be an important factor in determining the distribution of the gangrene

One of the characteristic features of the scrotum is that it contains no fat, there is therefore minimal supporting tissues for the blood-vessels which are thin-walled, and if these are angulated to a right angle the circulation in them is first impeded and then cut off The alternative route of escape of blood from the lower two thirds of the scrotum is via the posterior central vein already mentioned, but if this is thrombosed the blood cannot get away at all and the thrombosis may spread out to the site of lateral venous obstruction The ease with which obstruction can be caused to the passage of fluids through a thin-walled tube can be demonstrated easily by attaching a rubber catheter to a bladder syringe and pushing water through it, if the catheter is angulated to beyond a right angle, the passage of fluid is stopped completely It is therefore suggested that the most likely cause of Fournier's gangrene of the scrotum is a thrombosis of the posterior central vein of the scrotum, the result of streptococcal infection of the tissues

Morowich in 1904 postulated a theory of blood coagulation which has found considerable support since that time, namely, that infection by organisms causes cellular tissue damage—this gives rise to the release of thromboplastin The thromboplastin converts prothrombin into thrombin, the thrombin then combines with fibrinogen and with the aid of calcium forms fibrin and so clotting is produced It seems probable with these facts in view that Fournier's gangrene of the scrotum is caused primarily by a streptococcal infection of the scrotum, as indicated by the thin serous discharge and the finding of the germs in the deep tissues in these cases Infection gives rise to the changes initiating the thrombosis of the deep central vein of the scrotum The central vein thrombosis might have a limited effect were it not for the special characteristic of the scrotum The shape of the structure and the mechanical factors introduced by the angulation of the skin at a fixed position when the patient assumes the sitting attitude are important factors in the ætiology of the condition The upper third of the scrotum escapes the gangrene, having the advantage of an accessory blood supply and drainage via the vessels of the external pudendal system which are associated with the femoral system

This mechanical factor in production of gangrene of the scrotum may have a comparable condition arising in the case of infective gangrene of the skin of

sought for cosmetic reasons. A difference in the size of the two testicles often causes some alarm. Gross enlargement of a testicle may cause inconvenience to a patient for various reasons. Fig. 90 shows such a patient with a large hydrocele right side. Fig. 91 shows the same patient following right orchidectomy leaving the cord long, section being made at the level of the base of the testicle.

Mothers now frequently bring their infant sons to hospital because of an undescended or misplaced testicle. A transient hydrocele is frequently seen in infants at the age of 6 weeks; this occurs at a time when the tunica vaginalis is being finally closed off from the peritoneal cavity. The accumulation of fluid about the testicle is usually only temporary and in about 50 per cent of these cases no operation is necessary. Re-examination at the age of 3 months is usually advised.



FIG. 90
Large (right) hydrocele before operation

The subject of elephantiasis of the scrotum with and without involvement of the testicles is dealt with in the appropriate section on filarial diseases as a matter of convenience.

Indigenous male patients in the tropics are on the average much more highly androgenised than male persons living in temperate climates. By comparison the former, after adolescence have a scrotum which is much more pendulous, with testicles suspended on longer spermatic cords. This comparative difference appears to be an inborn characteristic. There is much greater emphasis laid on the psychological importance of sex life and reproduction than is the case in most communities living in non-tropical countries.

There are six main groups of diseases by which testicular abnormalities may be caused:

1. Local bacterial infections—gonococcal, tuberculous and coliform, *B. coli* etc.
2. Helminthic infections—the filarias, schistosomes and guinea worm conditions.
3. Protozoal infections—these are trypanosomiasis, malaria.
4. Virus infections—typified by mumps.
5. Neoplastic diseases—malignant diseases usually, benign conditions being rare.
6. Trauma—injuries and torsion.

tropics Many of the cases seen and treated have been dealt with during the years prior to the time when penicillin was available for clinical use Before penicillin was available sulpha drugs by mouth and novarsenobenzol intravenously were used extensively The arsenicals are helpful because of their effect on the spirochætes, but they must be used with caution if the patient is very ill

The patients often show some degree of hæmolytic tinge about the conjunctiva Those keen on plastic surgery usually advocate skin grafts for the granulating surface It is quite surprising how the testicles are withdrawn back into the remains of the scrotum, and ultimately there is only a small scar left representing the area of tissue lost Fig 87 shows the same case as in Fig 86, healing having taken place After separation of the slough, it is of interest to note how healthy [illegible] This [illegible] ouring [illegible] gested, rather than the arteries Skin grafting of this condition has not been used personally

It would appear that removal of the slough is desirable, but natural healing gives rise to better cosmetic results even if slower Attention to the patient's general health is most important during the illness and during convalescence Anticoagulant drugs used in the early stage of the disease should be beneficial, but cases are seldom seen sufficiently early to be so benefited and they have therefore not been used personally Support and local dressing to the scrotum are necessary while the sloughs are separating If eusol is used it must be in very weak solution or it is liable to be painful Acriflavine dressings are as good as eusol and are not painful It would appear difficult to maintain skin grafts in position considering the mobility of the area being grafted Natural healing without grafting has been the method of choice in the cases treated

DISEASES OF THE TESTICLE

Abnormalities of the testicles are seen much more commonly in the indigenous peoples of tropical countries than in male patients in temperate areas of the world This is largely due to the high incidence of various forms of tropical disease such as those caused by blood stream helminths and tissue worms In this category are found the filarias, the guinea-worm infections and schistosomes or blood flukes The incidence of testicular disease is also raised by the frequency with which infection of the genito urinary tract is found Some cases of orchitis are due to blood borne infection of various sorts Any form of septicæmia may precipitate an orchitis, there are therefore numerous theoretical possibilities, but these are principally of academic interest As a matter of convenience abnormalities of the spermatic cord are considered under this heading Hernial conditions affecting the scrotum have already been considered with abdominal diseases

Patients seek treatment for testicular abnormalities for various reasons, the most usual being localised pain They are worried by palpable abnormalities adjacent to the testicle and obvious gross enlargement of the structure In some instances an apparent decrease in its size worries them Advice is sometimes

structure up to the inguinal area Gonorrhœal infections of the epididymis are acutely painful *B coli* infections are much less so, while tuberculosis gives rise to a persistent dull ache rather than acute pain The discomfort is aggravated by palpation Neoplastic conditions and gummatous infiltrations of syphilitic origin are associated with very little pain, almost painless enlargement being the main character There may be hormonal changes accompanying testicular tumour formation If gonorrhœal epididymitis is suspected evidence of urethritis should be looked for

If tuberculous involvement appears most likely, in less acute cases, other evidence of tuberculosis should be sought in the urinary tract and the lungs With *B coli* infections the urine is usually heavily infected with this organism and evidence of other sources of infection is absent If abscess formation in the epididymis is apparent pus should initially be removed, using a long serum needle, penetrating the skin some distance from the abscess The pus should be cultured and examined for organisms direct, and guinea-pig inoculation can be undertaken for tubercle bacilli where facilities are available Abscess formation is very rare in gonorrhœal conditions, and is seen infrequently in *B coli* epididymitis but it is comparatively common in tuberculous infections of the epididymis and testicle, in fact, abscess formation strongly suggests a tuberculous infection Although pulmonary tuberculosis is common in the tropics, in many parts tuberculous epididymitis is surprisingly seldom seen

Epididymo orchitis following prostatectomy is seen much less commonly in African patients than following operation on patients in temperate climates The practice of tying the vas deferens following prostatectomy, although an excellent procedure for preventing post-operative epididymitis, has not been adopted personally as a routine procedure It has been used on a few occasions in European patients with a view to avoiding complications Indigenous male patients in the tropics strongly resent sterilisation The use of bacteriostatics following prostatectomy have therefore been relied upon to decrease the risk of epididymitis in obviously infected cases

Virus infections may be followed by orchitis with subsequent atrophy of the testicle This is a rare occurr [illegible] owing mumps or virus parotitis [illegible] n the tropics The painless chara [illegible] ice of syphilis elsewhere in the body in combination with a high positive Wassermann or Kahn reaction suggest the condition, in the absence of other obvious causes As a result of leprosy there may be atrophy of the testicle and this in some instances is followed by the development of gynæcomasty A photograph of a male patient with gynæcomasty (Fig 92) illustrates the appearance This patient was the father of a female child aged 12 years The patient developed leprosy and subsequently gynæcomasty A high proportion of the cases of gynæcomasty seen personally have been in leper patients

Fungoid conditions of the testicle are also seen in the tropics A very large mass develops which involves the skin and breaks down The appearances suggest malignancy, but on microscopic section of the tissue removed, no malignancy is detected but a heavy growth of fungus is apparent There is secondary septic involvement of the growing mass with implication of the groin glands and internal

Gonorrhœal infections spread from the prostate via the vas deferens to the epididymis An acute epididymitis comes on usually one to two months after an attack of acute urethritis, which is inadequately treated or not treated at all Abscess formation in this condition is rare The epididymis ultimately becomes indurated and thickened and hard There is very little involvement of the body of the testicle *B coli* gives rise to a less acute form of epididymitis but the end result is the same The testicle itself is little affected There is usually a heavy



FIG 91
Same case as Fig 90 following orchidectomy with long cord

coliform infection in the urine in these cases With tuberculous infections the epididymitis produced is of a much less acute type, going on for several months and ultimately going to abscess formation The overlying skin becomes involved and breaks down There is sometimes beading of the vas deferens which can be felt through the layers of the scrotum The body of the testicle tends to become involved in the tuberculous condition with slight enlargement In considering the symptom of pain relative to testicular pathology, it can be said that acute conditions are very painful while less acute conditions are less painful, often chronic changes are associated with very little pain Where infection has been introduced via the vas deferens there is discomfort travelling along the course of that

These drugs cause a fall in blood-pressure when administered and a lowering of the blood sugar temporarily, so caution must be exercised in their use

Helminthic infections of the blood and tissue types account for about 50 per cent of all cases of testicular disease in the tropics There are several filarial diseases which will be considered in more detail in the appropriate section Microfilaria occurs in the blood stream in the case of infections with five main types of filaria, depending on the part of the world concerned *Wuchereria bancrofti*, *W malayi*, *Loa loa*, *Acanthocheilonema perstans*, *Mansonella ozzardi* In the first two types the microfilaria are found in the blood stream at night, with *Loa-loa* the microfilaria are found in the blood stream during the day, with *A perstans* and *Mansonella ozzardi* there seems to be no special periodicity in the appearance of the organism in the circulation The microfilaria associated with skin and tissues, but not found in the blood stream, is *Onchocercas volvulosis* Details of the characteristic of these microfilaria are given in the section on filariasis

If patients with hydroceles are tested for microfilaria, it is commonly found that about 20 per cent of the cases seen in West Africa contain microfilaria of the *Onchocercas volvulosis* type on examining skin snippings from the skin of the leg Serum is expressed from the skin snipping on to a slide and looked at direct under a coverglass Microfilaria are very easy to detect if present Equally good results can be obtained by scarification of the skin, as in vaccination, and expression of serum from the eroded skin by digital pressure In a further 20 per cent microfilaria can be found in the blood stream, but it is necessary to undertake a series of examinations of thick films, taken at four-hourly intervals, so that parasites are found whether they have a diurnal or a nocturnal periodicity If 40 per cent of the cases of hydrocele seen are found to have microfilaria of some sort in the blood or tissues, there is little doubt that in many cases where filaria is not found the patient has had filaria infection which has become quiescent Lichtenberg and Medina,[21] working in Puerto Rico, consider that filariasis accounts for 80 per cent of all cases of hydrocele in that part of the world They found the parasite, however, in only 20 per cent of their cases

Some cases of hydrocele are due to guinea worm infection These long tissue worms are found imbedded in the wall of the hydrocele sac (Fig 93) In other cases they may be seen along the side of the scrotum and along the course of the spermatic cord Fig 94 shows such a case with the head of the guinea worm protruding close to the groin These parasites give rise to gross funiculitis or inflammation of the tissues of the spermatic cord, producing a tangled fibrotic mass with marked thickening present Guinea worm in the cord is much better left alone, as it is difficult to dissect out and is liable to be followed by secondary infection and complications The worm frequently dies in that position and becomes calcified It may sometimes be wound out of the scrotum with very little difficulty if it comes to the surface itself (Fig 95) Paragonimiasis is reported to cause an orchitis occasionally in the tropics in the Far East This condition has not been noted personally as paragonimiasis occurs in only a few isolated places in West Africa A few cases of paragonimiasis were noted in Upper River Gambia in 1936 The lungs were affected in these cases

ıphatic glands Fungoid conditions are treated by orchidectomy with excision a portion of the involved skin Preliminary measures are necessary to clean the surface secondary infections before operative interference The treatment the tropical fungoid conditions is very difficult and rather unsatisfactory The st promising drugs appear to be diaminodiphenyl sulphone, termed "D D S," l diamidinodiphenylamine dihydro oride, depending on the type of igus isolated This matter is isidered at some length under the ıding "Infections and Ulceration the Tropics' The antibiotic drugs common use are of benefit only in aring up secondary infections Van en[21] describes the action of certain d extracted from bacteria which kills a fungus on which they grow This ıtibiotic, termed Bongkrek Acid, s discovered in Indonesia in 1950 use is not devoid of danger because the hypoglycæmia which it causes is of interest to correlate this hypo- cæmic action with the hypo ·cæmic action and acute drop in · blood pressure caused by the ımidine type of preparations, which s personally noted when testing out me of these preparations on sleeping kness cases in 1939 (Bowesman") l this group of drugs tend to cause a ırked fall in blood pressure when ven intravenously and caution must exercised in their use In view of e risk of the fungus conditions ving spread beyond the limits of e testicle, the use of the diamidine drugs should be considered following eration Suggested preparations are



FIG 92

B lateral gynæcomasty in male leper patient following testicular atrophy (Photograph by kind permission of Dr M P Browne)

1 Diaminodiphenyl sulphone—D D S, also called Dapsone, still in experimental stage (MacKinnon[23]) This preparation is manufactured by Imperial Chemical Industries, Manchester, England
2 Hydroxystilbamidine isothionate, 250 mg ampoules for adults Smaller doses for children Injections given three times a week for ten weeks Total dosage 7 5 to 10 gm in some cases This is a May & Baker product
3 Diamidinodiphenylamine dihydrochloride—"M & B 938"—100 mg and 250 mg ampoules Injections given twice a week for ten weeks (Available for investigation purposes on special request from May & Baker)

Hartz and Toledano[25] report a case of orchitis which they attribute to a *Trypanosoma cruzi* infection in South America Orchitis is sometimes seen in other forms of trypanosomiasis It is difficult to prove that an orchitis is due to trypanosomes and an examination is seldom made with this in view Malaria may give rise to symptoms simulating almost any disease and orchitis has been included in this list, but it would not appear to be an important factor in the production of orchitis in the tropics even if it is possible Schistosomiasis also gives rise to orchitis and hydrocele This is not surprising considering the irritation that the ova of *S hæmatobium* gives rise to in the tissues, and the fact that Gelfand and Ross[26] found that in 34 4 per cent of cases with schistosomiasis coming to post-mortem examination, the testicle was involved with *S hæmatobium* ova



FIG 95

Guinea worm being removed from the scrotum (Photograph by kind permission of Mr N Graham)

In *S mansoni* infections only 5 25 per cent of the cases showed testicular involvement Van Beukering and Vervoorn[27] investigating a case of hydrocele, found *S hæmatobium* ova in the hydrocele fluid It is surprising that schistosome ova are not found more frequently in this condition In cases examined personally the results have been uniformly negative, but the examinations were not very exhaustive or complete

Torsion of a testicle appears to be a rare condition It is more common in cases where the epididymis is not firmly attached to the body of the testicle and there is an abnormally horizontal axis assumed by the body of the testicle in the scrotum This causes greater liability to rotation If rotation occurs the testicle is pulled up into the high scrotal position, there is very severe pain present and local œdema in the scrotum develops very quickly If the condition is suspected the scrotum should be opened and the rotation rectified by untwisting the cord The testicle is subsequently fixed in the lower part of the scrotum to prevent recurrence In neglected and late cases where gangrene of the testicle is imminent it may be advisable to remove the testicle rather than run the risk of necrosis



FIG 93
Testicle removed showing guinea worm in wall of hydrocele sac



FIG 94
Guinea worm funiculitis The tail of the parasite is seen in the groin

The lower end of the nylon is then held and the cannula withdrawn upwards The nylon is then cut off above and below almost level with the surface of the scrotum By manipulating the testicle with the skin of the scrotum held between the fingers the nylon ends can be pulled beneath the skin surfaces above and below This nylon strand remains in position, maintaining a permanent puncture opening of the tunica vaginalis above and below and so allowing the fluid formed to drain away into the soft tissues Strict aseptic precautions must be observed to prevent infection in the tissues By this means a permanent drainage is maintained This simple method gives quite good results and saves repeated tappings in elderly patients No sutures are required, and the method being simple can be undertaken in out-patients A strong sedative can be given before the insertion of the trocar and cannula, this makes an anæsthetic unnecessary If the patient understands that this is a palliative measure only, he may be quite satisfied with the result The swelling in the affected side of the scrotum remains slightly larger than a normal testicle, but it is much reduced considering the original size of the hydrocele The hydrocele recedes to about half its original size or a little less in some instances

The use of sclerosing fluids introduced into the hydrocele sac after tapping is considered unsatisfactory and a practice that is not recommended Any simple procedure which reduces the number of hydrocele operations is welcome where hydroceles are very common as in many parts of the tropics The incidence of hydroceles varies very much from one district to another Burkitt [28] noted that in the eastern part of Lango Province, Uganda, 25 per cent of the adult male population suffered from hydrocele, while only 1 per cent of the adult males suffered from the condition in the western part of the same province In 43 per cent of the cases the condition was bilateral

In recent years there has been a much greater tendency to use scrotal incisions for the surgical treatment of conditions of the testicle Inguinal incisions are now seldom used for the treatment of hydroceles unless a hernia and a hydrocele are being dealt with at the same time The direct approach to a hydrocele through a scrotal incision is much more direct and satisfactory than when a groin incision is used Much better hæmostasis can be obtained working under direct vision The conservative operations for hydrocele are opening and reversing of the sac, and excision of the sac which is reserved for cases with a very thick wall Tapping and traversing the sac with floss nylon are classed as minor procedures

The major hazards of hydrocele operations are post operative hæmatoma formation and to a lesser extent the occurrence of sepsis Hæmatoma formation is invariably the result of inadequate hæmostasis In many instances the sac of a hydrocele may be reversed and sutures inserted to maintain this position, and at the time of closure of the wound the operative field looks comparatively dry, but in spite of this a large hæmatoma will be noticed within forty-eight hours, this is probably due to reactionary hæmorrhage Drainage tubes are most unsatisfactory and large hæmatomata may form in spite of the tube being inserted In approaching a hydrocele there are several layers of fascia covering it, each representing a tissue layer from the abdominal wall These layers are thin and

Malignant tumours of the testicle are considered to be comparatively common by some workers in the tropics, but very few malignant growths of the testicle have been noted personally In some cases where this malady was suspected in young male adults the condition was found on investigation to be due to a very thick-walled hydrocele With testicular tumours the body of the testis is involved, usually without involvement of the epididymis In some cases secondary hydrocele develops The tumour tends to be heavy in relation to its size when felt With testicular malignancy there may be some degree of feminisation noted The development of gynæcomasty may be seen, and if a Zondek-Aschheim test is undertaken with the urine of the patient so affected, it may be positive In the few cases of testicular malignancy seen, the tumour has been almost painless and very hard in consistency The tumour was in each instance removed with the overlying skin and the spermatic cord well up into the abdomen, along with some of the glands placed above the level of the inguinal ligament Three cases only have been dealt with in this way and in none of them was recurrence noted during the limited time they remained under observation after operation—six months to one year

In dealing with cases of enlargement of the testicle it is obviously desirable if possible to ascertain the cause of the enlargement Conservative measures should be adopted if these offer a reasonable hope of arresting the condition and making it quiescent It is undesirable to remove a testicle if the condition can be treated without surgery A slight abnormality of a testicle in the absence of active disease is not necessarily an indication to remove it In those cases where there is a slight hardness about the epididymis of many years' duration the condition is better left alone Patients may agitate to have small quiescent nodules about the epididymis removed, but if it is explained to them that removal of such a nodule will almost certainly render the testicle sterile, if it is not already so, they are usually willing to leave them alone If active pathology about the testicle cannot be arrested by medical means, surgery is then indicated

In cases of hydrocele, if the underlying cause of the condition is found it is advisable to treat it This may prevent involvement of the other testicle before a similar process starts there If extensive tissue changes have taken place in the involved structure, surgery is usually necessary to reduce the size of the mass Elderly patients complaining of hydrocele are often content to have the fluid removed by tapping periodically This makes them more comfortable but it is not a permanent method of dealing with the situation

If a hydrocele is thin walled and the patient does not wish to have an open operation, a minimal procedure may be undertaken to relieve the condition by inserting a permanent floss nylon drain right through the hydrocele leaving a wick of nylon floss protruding into the soft tissues above and below the hydrocele sac This floss nylon strand can be introduced by inserting a long narrow trocar and cannula right through the cavity of the sac from above downwards in a position away from the position of the cord structures The instrument is inserted above through the skin of the scrotum, into the hydrocele and is brought out through the lowermost part of the hydrocele below and out at the base of the scrotum A floss nylon strand is passed through the cannula, using a wire to pull it through

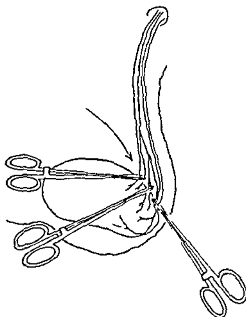


FIG 96
Diagram illustrating operation of orchidectomy with long cord for non malignant disease



FIG 97
External genitalia of patient with large cyst o Cowper's gland



FIG 98
Cowper's gland cyst as seen at operation Same patient as in Fig 97

filmy Hæmatoma formation may occur between any of these layers as vessels retract on being incised The insertion of a tube does not drain the hæmatoma in all cases as the blood accumulates between individual layers and the tube is inserted down to the testicle, it is therefore often useless The tube invariably permits of the entry of ascending sepsis and this is most undesirable Realising the almost impossibility of ensuring absolute hæmostasis by ligation of individual vessels, it was decided many years ago to adopt the method of infiltration of the inguinal and scrotal tissues all round with 1 in 200,000 solution of adrenaline before opening the scrotum As a result of this procedure very few blood vessels need to be tied and the testicle following reversal of the sac can be put back into its bed and the cavity remain very clear of oozing of blood or serum The tissues can be closed completely without the use of a drainage tube If adrenaline is used in this way a drainage tube is quite unnecessary Since it was adopted about ten years ago no hæmatoma formation has been noted in any of the cases operated upon Prior to its use hæmatoma formation was noted in about 10 per cent of the cases—some small, some large, some enormous The adrenaline infiltration method is simple, highly efficient, and in every way entirely satisfactory and it is therefore strongly recommended Convalescence is rapid and satisfactory to all concerned

On reversing the hydrocele sac it is recommended that three insoluble fine ligatures be used so that it does not slip back to its pre-operative position and predispose to a recurrence If a hydrocele sac is unduly bulky or contains material like cooked mince-meat, it is desirable to excise it The excess of sac beyond the lateral edges of reflection from the surface of the testicle is removed in such a way as to interfere as little as possible with the blood-vessels locally Bleeding from the edges of the excised sac is troublesome and many ligatures may be required If apparatus is available a diathermy current should be used for excision of the sac It can also be employed for coagulation of individual vessels which may bleed Some vessels need to be under-run with a suture Careful judgment is needed to decide when an orchidectomy should be undertaken rather than conservative surgery for hydrocele If a hydrocele sac is very thick walled and contains over 1 pint of fluid, the testicle is better removed The patient's consent should be obtained before this is undertaken Most male patients are naturally very reluctant to have a testicle removed, unless they fear malignant [illegible]

s [illegible]

three major advantages in non malignant cases The cord, having splayed out over the surface of the hydrocele to a considerable degree, can be tied off in multiple small bunches rather than in one large mass when it is removed higher up This decreases the risk of post-operative hæmorrhage and hæmatoma formation The next major advantage, following orchidectomy with long cord, is that after the testicle is removed the tissues of the cord form a bulbous mass [illegible]

undertaken for patients over the age of 40 Prostatic enlargement appears to be equally common in tropical countries and non-tropical parts of the world The belief that prostatic enlargement is rare in tropical countries is not correct Many patients with prostatic obstruction are inevitably a high surgical risk Most cases of acute urinary obstruction due to this condition are seen during the rainy season, whenever that may be, depending on the part of the world concerned This is probably due to the fact that following a heavy rainfall in the tropics the temperature of the outside air falls very considerably for several hours, and with the fall of temperature retention of urine is precipitated

Considering the long distances between hospitals and the limited transport facilities available, many elderly patients are brought to hospital in a very distressed state They are restless and strain persistently in an effort to empty a grossly over-distended bladder, which is usually up to the level of the umbilicus when they are first seen The immediate problem in treatment is to relieve the patient's distress To consider an immediate suprapubic prostatectomy in a patient in a totally unprepared condition is a prohibitive risk The congestion about the prostate, induced by bladder distension, would predispose to post-operative hæmorrhage In the circumstances it is advisable, using the strictest aseptic technique possible, to pass a rubber urethral catheter and empty the bladder No accidents have been noted following emptying the bladder completely in one stage despite the theoretical risk of intravesical hæmorrhage and renal congestion If the rubber catheter enters the bladder easily on the first occasion, it will doubtless enter it without undue difficulty on the second occasion It is therefore better removed and the patient allowed to have a good sleep Preliminary toilet of the abdomen should be undertaken immediately with a view to operation possibly within twenty-four hours The patient almost certainly will need to be catheterised a second time twelve hours after the first catheterisation Fluids by mouth should be limited to save unnecessarily frequent catheterisation prior to operation

Difficulty arises where a rubber catheter will not enter the bladder The standard pattern metal urethral catheter has an unduly accentuated curve on it to permit of easy entry into the bladder in cases of prostatic enlargement If the catheter is forced unduly, injury with hæmorrhage from the prostatic urethra will occur In these circumstances where a prostatic metal catheter is not available, and it seldom is in country stations, it may be possible to pass a gum elastic catheter This piece of apparatus also is seldom available, as in tropical climates gum elastic material deteriorates very easily and quickly The method which is very useful indeed in these cases is to resort to the use of the Rotunda Hospital pattern female metal catheter This instrument has a very slight curve on it and will frequently enter the bladder in cases of enlarged prostate where no other instrument will go through the obstruction This information though simple may be very useful to doctors in the adverse circumstances in which they find themselves placed The catheter is not made for male patients, but it is usually available for use in maternity cases in most remote country stations This use of a female metal catheter should not be forgotten The instrument must be introduced to its full length in order to enter the bladder

depression on the part of the patient, as he still feels that the scrotum contains at least something of manly proportions even if not two testicles The residual mass produced by this method simulates a testicle very closely Fig 90 shows a patient with a large right sided hydrocele Fig 91 shows the same patient following orchidectomy, leaving the cord long The photo was taken during early convalescence The appearance further improved after some months

If for any reason the body of the testicle becomes infected and breaks down with discharge of pus containing a mixed infection of organisms, it is advisable to remove it Absorption from a septic infection of the body of the testicle makes a patient very ill indeed The infection is particularly difficult to control and the patient's general condition deteriorates rapidly Under the circumstances, once sepsis within the body of the testicle is confirmed early orchidectomy is indicated

Another swelling in the scrotum other than the testicles may be due to a hydrocele of the cord, a residual mass of the funicular process which has been cut off above and below but not completely obliterated and so fluid accumulates It is usually excised without undue difficulty On rare occasions an enormous cyst of the scrotum may be found These are most frequently derived from a Cowper's gland which has become obstructed and so enlarges with secretion produced within it Fig 97 shows a cyst of the scrotum before operation Fig 98 shows the cyst being removed It was excised complete without being ruptured The wound healed by primary union When undertaking any operation on the scrotum, the use of adrenaline infiltration with 1 in 200,000 solution is advised It makes these operations about the scrotum much simpler and safer Following scrotal operations the wounds are closed by interrupted sutures of fine monofilament nylon The sutures approximate the edges lightly and should not be tied too tightly Michel clips are not advised on the scrotum Wounds of the scrotum are not followed by keloid formation in any instance as there is no fat in the layers of the scrotum Keloid wounds form only in the presence of the degeneration products of fat

PROSTATIC OBSTRUCTION

In choosing sub-headings an endeavour has been made to deal with subjects in such a way as to bring together the circumstances in which doctors in isolated stations find themselves placed Methods of treatment and ways of handling difficult situations are much influenced by the setting in which they are placed In the large centres with good surgical facilities, adequate assistance, and reasonable surgical training, the matter of dealing with prostatic obstruction differs little from one part of the world to another Standard works on surgery give excellent descriptions of methods and technique for dealing with prostatic enlargement and the various complications to which the condition predisposes The task is very much more difficult in isolated country stations where one is expected to deal, almost single handed, with some of the most urgent emergencies In these circumstances it may be necessary to deal with cases of enlarged prostate where a patient's attendance at the hospital is precipitated by acute urinary retention

Most patients with acute urinary retention due to prostatic enlargement are over the age of 50 years There is an increasing risk in most surgical procedures

operations prior to arriving in the tropics, the position of junior colleagues faced with this *situation is appreciated* The results of prostatectomy depend to a considerable extent on the condition of the patient as well as the skill of the operator Many are reluctant to undertake a prostatectomy operation unless *assisted by a more senior colleague*, as the results are somewhat unpredictable

In the tropics, with limited laboratory facilities and where blood transfusion is not always easy to arrange, and there is no blood bank available, the risk of this operation is increased T'
male patients in West A
of prostatectomy runs at
absence of adequate laboratory services and blood freely available for transfusion the risk may be 15 per cent Although this risk is rather high it is not prohibitive, and if temporary measures are adopted (performing a suprapubic cystotomy alone and discharging the patient home) the position is not satisfactory With relief of congestion the patient starts to pass urine again through the urethra and the suprapubic catheter is removed The urinary fistula closes but the patient is only temporarily improved He subsequently *has the disadvantage that he has* added a urinary infection to his disabilities Recurrence of urinary retention is usual in these cases within twelve months The patient ultimately returns to hospital in a rather poor condition with a second attack of acute retention of urine On taking over one station forty patients were found to be attending the out-patient department for changing of a suprapubic catheter once a month These patients were classed as impassable stricture cases This unusual situation necessitated investigation, which revealed that more than 75 per cent of the cases had an enlarged prostate About 50 per cent of the cases were operated upon for enlarged prostate with reasonable results A small number of the cases were unfit for operation and a few of them were found to have a urethral stricture It would seem that the frequency of enlargement of the prostate was not fully appreciated

There are five standard procedures for the radical treatment of prostatic obstruction These are

1 Suprapubic prostatectomy by the open method with large incision
2 Suprapubic prostatectomy through a small incision by the blind method
3 *Retropubic prostatectomy via anterior prostatic route (Millin's technique)*
4 Perineal prostatectomy approaching the structure from below
5 Transurethral prostatic resection by diathermy loop or cold punch *apparatus*

Each of these procedures has advantages and disadvantages Having used all
ence may be
ime
tra-
peritoneal suprapubic approach and the long bladder incision to perform the open method of prostatectomy, the bladder must be very full and the peritoneal cavity very well "taken up" before sufficient room is afforded to make a large enough opening in the bladder to see the prostatic area of the base of the bladder wall A

A further difficulty may arise in which a patient with urinary obstruction judged to be due to prostatic obstruction, as estimated by rectal examination and the age of the patient, may be found to have an anterior urethral stricture *Such a stricture may preclude the entry of any form of urethral instrument into* the bladder The patient being in a state of acute distress must be relieved by some means as soon as possible If it is obvious that an anterior urethral stricture is present, it is advisable to perform an immediate suprapubic cystotomy at a position sufficiently high to permit of a subsequent suprapubic prostatectomy, should it be required, without running the risk of damage to the peritoneal cavity The position chosen is a matter of judgment as already indicated In these cases it is advisable to introduce a de Pezzer catheter according to the standard technique, or an ordinary rubber catheter may be introduced using an intermediate size trocar and cannula which will take a No 8 catheter if well oiled Suprapubic cystotomy by lumbar puncture needle is desirable only where it is judged that following the relief of congestion an instrument may be passed per urethram If a severe anterior urethral stricture is present, plus an enlarged prostate, an immediate suprapubic cystotomy with the introduction of a de Pezzer catheter is desirable

Having got over the immediate difficulty, the doctor is faced with the decision as to whether he should deal with the patient for his prostatic condition himself or arrange to have the patient transferred to one of the main stations for further operation Many patients, more used to village life than living in the large towns, refuse transfer, requesting that the operation be undertaken in the country hospital so that they may be near their people Such is an understandable request

Examination of a prostate as felt by rectal examination with the finger may be very deceptive, and in some cases a prostate judged to be large when the case is seen initially may subsequently be found after relief of the obstruction by catheterisation or suprapubic cystotomy to be not unduly enlarged It is therefore considered desirable to relieve the patient by rubber catheter initially Preliminary drainage of the urinary bladder by indwelling urethral catheter is again being adopted in England, although for some years it was discountenanced Preliminary cystoscopy prior to prostatectomy is desirable in *all* cases if it is feasible Judgment and discretion are necessary in deciding further treatment if the patient declines to be transferred to a larger centre for prostatectomy Some patients with prostatic symptoms of precipitancy of micturition and having to pass urine frequently at night may be suffering from a chronic inflammatory prostatic condition These cases are better treated conservatively, certainly initially by antibiotic drugs and preparations such as Halmagon Marked congestion over the prostatic surface of the bladder seen on cystoscopy suggests the condition There may be very little prostatic enlargement in these cases Conservative methods have a limited use in such cases If prostatectomy is undertaken in inflammatory cases there is a high rate of post-operative complications

Large central hospitals are much taxed by the transfer of cases which might, in many instances, be operated upon in their own district hospital If the doctor in the small country station is prepared to undertake straightforward surgery it is a good thing to encourage *Having myself undertaken very few prostatectomy*

appears like an overhanging shelf above the prostatic cavity The prostate is thus dislocated into the bladder in one large mass The structure is then removed from the bladder using a volsellum forceps to grip it

Before attempting to pull the prostate through the bladder opening, it should be *rotated gently as it is gripped by the forceps* to make quite certain that the wall of the bladder has not also been gripped by the forceps If the prostate is not unduly large, it may come through the suprapubic opening in one piece In some cases the mass is much too large and it is necessary to remove the lobes of the prostate one by one As a lobe is pulled through the bladder opening it is separated from the remainder of the prostate by tearing it off, and so with the

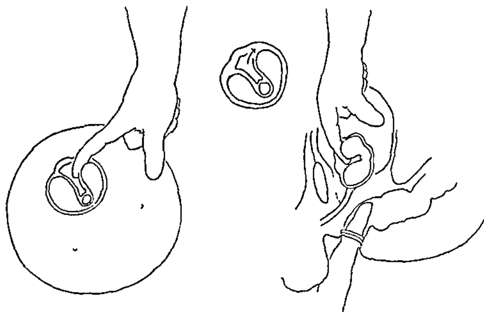


Fig 99
Suprapubic transvesical prostatectomy Enucleation of prostate

next one, until all are removed from the cavity of the bladder Undue time should not be lost in bringing the prostate through the bladder opening, as active bleeding may be taking place from the prostatic bed during this time Some bleeding is inevitable After removal of the prostate a hot saline douche is given through a large-bore rubber tube from a sterile receiver The blood clot in the bladder is thus washed out The hot douche at 105° F acts as a hæmostatic agent, contracting down the prostatic bed *The table is tilted slightly, foot down, in order to allow* the overflow of saline to run away to a receiver at the foot of the table The tilt should not be more than a few inches as if it is unduly steep the patient's blood-pressure is liable to fall and this would constitute a risk of collapse

Using this method minimal trouble has been encountered and whereas there have been a few cases of reactionary hæmorrhage during the first twenty-four hours after operation, these have seldom been alarming and

mechanical self-retaining retractor is inserted through the abdominal wall and into the opened bladder so that the operative field can be seen before, during and after removal of the prostate The advantages of the method are that hæmorrhage can be adequately controlled under direct vision after the prostate has been removed The middle and lateral lobes of the prostate are removed complete Following removal of the prostate a large-calibre rubber tube is inserted suprapubically into the bladder The bladder and abdominal wall are closed round the tube The disadvantage of this method is that after removal of the suprapubic tube it takes usually not less than four weeks for the suprapubic opening to close completely The duration of suprapubic wetness and hospitalisation are longer than when other methods are used Time, however, is no object if it is safer to use this method It may not be a bad method for those with limited experience and those who are apprehensive about post-operative bleeding

In the second method, where prostatectomy is undertaken by the suprapubic route through a 3 in incision, the procedure is considered excellent and is the method which has been adopted personally on most occasions The opening in the bladder wall itself need not be more than 2½ in long The approach is extraperitoneal, entering the bladder when it is well filled With this small bladder opening it is not possible to see the floor of the bladder and the top of the prostate with any ease The operation is therefore a "blind method," being undertaken using a sense of touch only The operation undertaken by this method requires a much shorter time than when a large bladder incision is made Bleeding vessels cannot be seen at all following removal of the prostate and hæmostasis is entirely dependent on the use of a hot douche of a temperature of about 105° F Having been originally instructed in the method of enucleation of a prostate starting at the back of the middle lobe, this method was soon abandoned in favour of what is considered to be a much easier and more accurate technique, namely, putting the index finger of one hand into the prostatic urethra and starting the separation from there

By this method (Fig 99) it will be noted that the shape of the prostatic urethra gives the impression of being like a narrow anteroposterior slit or narrow rectangle Each of the lateral walls is bulged in by the spherical mass of the lateral lobes on each side On digital pressure within the prostatic urethra, between the anterior and lateral walls on either side, the urethra splits very easily This permits of entry into the plane of cleavage between the prostatic substance and the fibrous capsule of the gland By entering this position right and left in turn both sides of the gland can be enucleated with comparative ease The base of the lateral lobes can be reached much more easily if an assistant puts an index finger in the rectum and with the ventral aspect of the first phalanx pushes the prostate forwards and upwards The under surfaces of the lateral lobes being pressed upon brings them to a higher position making them more accessible to the separating finger within the bladder As the lateral lobes are separated the middle lobe is approached from the sides and below and ultimately the bladder mucous membrane is torn off at the back of the middle lobe, thus freeing the prostate completely The prostatic urethra is torn across at the level of about the middle of the prostate or between that part and the apex The floor of the bladder then

have good light in order to see precisely what is being done A diathermy apparatus and some form of suction device are both highly desirable, though again neither is absolutely essential The steps in the technique can be found in most of the standard textbooks on genito-urinary work The illustrations in most instances are taken from the original monograph of Millin[30] on retropubic surgery The procedure is briefly as follows

Through a transverse suprapubic incision the space of Retzius *is entered*, the recti muscles being separated by self-retaining retractor to which a bladder depressor blade is fixed The fatty tissue is cleared off the front of the prostate with swabs on long sponge-holding forceps Good lateral clearance is necessary right out to the *obturator foramen on each side A laterally placed roll* pack is inserted on each side of the retropubic space A transverse incision is made through the capsule of the prostate at the junction of its middle and upper third on its anterior cleared surface If there is a large vein crossing the line of incision it should be coagulated or understitched before being cut across On opening into the prostatic urethra the fluid from the bladder rushes out filling the space of Retzius The suction apparatus is useful at this stage to withdraw the fluid In country stations, if electric suction apparatus is not available, a foot suction apparatus or a large rubber bulb hand suction with a long nozzle is quite suitable A finger is inserted through the prostatic incision and the prostate is enucleated After enucleation of the prostate hæmorrhage is arrested under direct vision using pressure swabs and diathermy

After the prostatic cavity is clear and hæmorrhage is controlled a large-calibre rubber urethral catheter is inserted through the external urinary meatus into the bladder The tube should be about 1½ in into the cavity of the bladder and fixed anteriorly to prevent it altering position In suturing the prostatic capsule it is a considerable help to insert a stay suture at each lateral extremity of the prostatic incision This permits of slight lateral traction with an upward trend which helps to approximate the edges to be sutured In order to make a watertight joint it is essential to use a continuous stitch, this is most important Interrupted stitches should not be used, this was done in one or two of the cases undertaken personally at an early stage, the necessity of a continuous stitch not being fully appreciated There was, following operation, a slight suprapubic urinary leak *for about* one week or *ten* days following the operation—this should not have happened If a continuous stitch is used, No o chromic catgut being suitable, a post-operative suprapubic leak of urine through the wound is most unlikely to occur It is necessary to exercise great care before closing the deep layers to see that no swabs *have been left in the depth of the wound in* the cave of Retzius An oversight in this respect might happen very easily as bloodstained swabs become flattened down and are sometimes difficult to see Gauze packs on each are safer than individual swabs for this reason as forceps can be clipped on to them

Because of the confined space in which the stitching has to be undertaken it is essential to have available a strong, small, curved needle which can be held in a long needle-holder A boomerang needle instrument is usually used for suturing the prostatic capsule, but an *ordinary needle and needle-holder* suffice

never fatal The criticism against this method is that hæmorrhage is not controlled as well as it might be Following this method the suprapubic drainage tube is left in for three days only The bladder wound being small, closes very quickly Urine is passed per urethram between the ninth and thirteenth day usually, seldom longer, and the suprapubic fistula closes completely within three weeks

Low spinal anæsthesia is personally considered to be the most suitable type for prostatectomy, 2 c c of stovaine being used This gives adequate anæsthesia below the umbilicus and is not associated with a fall in blood-pressure Ephedrine is not necessary or desirable when stovaine is used for low spinal anæsthesia The stovaine should be mixed with 4 c c of cerebrospinal fluid before it is injected into the thecal space Following spinal anæsthesia there is usually no vomiting and the patient stays quite quiet in bed As opposed to this, when a general anæsthetic is given the patient may be restless and is liable to vomit and strain after operation Spinal anæsthesia is therefore encouraged in these cases

To decrease the risk of post-operative hæmorrhage from the prostatic bed following operation in these cases Corlette [29] has advocated the use of pre-operative periprostatic injection of 1 in 200,000 solution of adrenaline He uses local anæsthetic in addition The injection is given by the perineal route before the operation is undertaken No operation for removal of the prostate has been attempted personally under local anæsthesia The use of a pre-operative perineal injection is rather inconvenient though it has been tried on a few occasions to see how it worked It may however be an advantage, with a view to decreasing the risk of post-operative hæmorrhage, to inject a solution of 1 in 200,000 adrenaline in water into the tissues of the floor of the bladder through the suprapubic opening using a Krause's abdominal local anæsthetic needle The needle is put down along the index finger through the suprapubic opening The position of the injection is estimated by palpating with the index finger Any long needle may be used for this purpose This method has also been tried on a few occasions and is considered very good The injections go into a position below the peritoneal cavity and the procedure does not appear to be dangerous Hæmorrhage from the prostatic bed following multiple injections round the sides of the prostate would appear to be much decreased The procedure has not been used as a routine method but it is satisfactory to feel that every attempt has been made to decrease the patient's risk in very congested cases Multiple injections of 1 c c in each of six positions are given

Retropubic prostatectomy (Millin's technique) is an excellent procedure It is, however, more difficult to undertake than a transvesical suprapubic prostatectomy The method can be used as a one-stage procedure, or in cases where a suprapubic cystotomy has already been performed for preliminary drainage Like any other operation which may be initially a little difficult, in the absence of previous experience, it is not unduly difficult with practice The many instruments designed for this operation are helpful but they are not essential These instruments are most unlikely to be found in country stations in tropical countries, unless they are the property of the doctor himself It is essential to

side of this initial bite One slice in each of the lateral lobes in the upper third of the prostate should also be made, but not more than this Fig 100 shows tissue removed in this way The advice given to those undertaking transurethral prostatic resection with limited experience is "Don't remove too much, be satisfied with six good bites alone"

The most suitable antibiotic drug to give following prostatectomy as a bacteriostatic during the healing of the prostatic cavity is streptomycin Chloromycetin is a second choice Both of these drugs improve the results considerably and decrease the risks of complications Following prostatectomy it takes up to one month for the residual prostatic cavity to heal completely Patients may be told of the slight risk of some bleeding about two weeks after transurethral

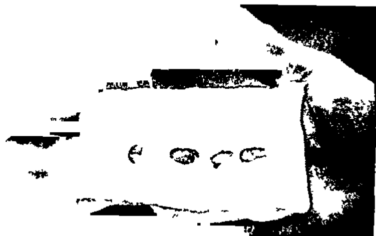


FIG 100
Tissue slices removed from prostate with McCarthy s resectoscope

resection as, though it is not unduly dangerous, it may cause a great deal of alarm to the patient if it occurs To warn the patient beforehand of this slight risk is an advantage as otherwise he feels that something has gone wrong with his operation If slight bleeding occurs which he has been warned about, he lays much less stress on its seriousness

Following prostatectomy patients are rendered sterile even though they may remain potent The only procedure which permits of the retention of fertility is a limited transurethral resection above the level of the ejaculatory ducts Where a well performed prostatectomy has been undertaken the patient s expectation of life may be increased by about ten years If a patient has an enlarged prostate and he is not treated he is very liable to develop vascular hypertension and an upper urinary tract infection Both these conditions markedly decrease his expectation of life

if the former is not available A small rubber drain is put into the retropubic space for forty-eight hours following the operation to allow of the escape of exudate which may accumulate The urethral catheter draining the bladder is kept in position for five days following the operation Whether the vas deferens is tied at the scrotum on each side or not following the operation, to prevent infection in the epididymis, is a matter of choice Most patients in the tropics would not wish to have the vas tied if they appreciated what was being done, though probably following prostatectomy the patient is rendered sterile in all cases other than when a limited transurethral resection of the middle lobe is undertaken

The other method adopted for removal of the prostate is through a perineal approach This procedure is not favoured as it is rather difficult to perform and not devoid of risk A special transurethral retractor is inserted with which the prostate is pulled down Following the operation there is a risk of urinary incontinence due to interference with both sphincter mechanisms of the urethra In approaching the prostate the rectum may be damaged very easily If the rectum is damaged while approaching the prostate the procedure must be abandoned The operation has no apparent advantages over the suprapubic methods It is therefore not encouraged

Transurethral prostatic resection is a highly specialised type of procedure and the details of technique are found in works on the genito-urinary system In country stations it is unlikely that central electricity supplies will be available, and so a diathermy apparatus is unlikely to be found in the hospital If these are not available the Gershom-Thompson cold-punch prostatic resector may be used as an alternative method Transurethral prostatic resection whether by the electric method or the cold-punch device might be termed a partial procedure as in no case is the prostate removed complete Its greatest use is in cases where there is a fibrotic prostate giving rise to urinary obstruction, although it is not unduly large in size By this method the urinary passage is cleared at the position of the middle lobe and to a lesser extent at the lateral sides above the position of the verumontanum at approximately the middle and upper third of the prostate It also has a limited use in obviously malignant prostates, where suprapubic drainage is not desirable If a suprapubic cystotomy is performed in a case of advanced malignant disease of the prostate it will not close, as the obstructive condition is a progressive lesion

Following transurethral resection the bladder is drained through the urethra using a rubber catheter for five days Because of interference with the internal sphincter mechanism it is usual to find that immediately following operation the patient can hold only a limited quantity of urine in the bladder—3 to 6 oz during the two to four months after the operation After this time much more urine can be held and the amount passed with each voiding increases until ultimately a normal amount is passed each time the bladder is emptied When this instrument is used it should be remembered that where tissue is removed a large amount sloughs at the position where the electro-cutting mechanism was used One should be satisfied when dealing with a small fibrotic prostate causing obstruction with removing two slices of tissue in the middle line and a further slice at each

accident Severe pain over the kidney area, particularly if unilateral following an injury and accompanied by blood in the urine, indicates almost without doubt that there is an injury of the kidney With extensive kidney injuries there may be fluctuation about the lumbocostal area of the back Several cases of presumptive injury of the kidney have been seen following accident with local signs and symptoms and blood in the urine, but it has been found that almost all cases have settled down without requiring a nephrectomy It seems that at least 75 per cent of the cases do not require operative treatment

On rare occasions a large perinephric hæmatoma may become infected with the production of a perinephric abscess Following opening of such an abscess some urine may leak from the wound but this seldom continues for more than a few days and is usually small in quantity It is advised in cases where kidney injury is suspected, with much blood in the urine, that the hæmoglobin level is watched carefully A falling hæmoglobin which is progressive, indicating hæmodilution, is a serious sign If the hæmoglobin level drops more than 10 per cent it is advisable to give a blood transfusion All cases of kidney injuries with blood in the urine should be immediately blood typed These arrangements should be made with the relatives of the patient before they leave the hospital, otherwise they may be very difficult to find again Relatives are usually much more willing to give blood for a transfusion when the patient is first brought to hospital than some days later when they think he is less urgently ill

Penicillin should be given early in cases of kidney injury to decrease the risk of abscess formation in the perinephric hæmatoma If the patient's loss of blood does not stop or get very much less within seventy two hours, or there is a progressively rising pulse rate, in spite of no evidence of internal injury from other causes, a nephrectomy should be considered In most cases the patient is very much better by the fourth day Active surgery is thus not required

A nephrectomy on the right side is more difficult than a nephrectomy on the left side as the right renal vein is shorter than the left vein Blood in the perinephric tissues makes the nephrectomy more difficult than when the operation is undertaken for other reasons, where the operation field is clear It is a great advantage when undertaking a nephrectomy to remove the twelfth rib This makes the operation much easier and removal of this rib with care does not open the pleural cavity If renal injury is suspected a straight X-ray of the upper abdomen may be helpful, as on the side of the renal bleeding into the perinephric tissues there is a lack of clarity of the renal shadow, comparing the shadows cast by the two kidneys Some caution is necessary in dealing with patients in some parts of the tropics who, following accidents, are found to have some blood in the urine A patient may suffer from multiple bruises following a lorry accident and on examining the urine it may be found to contain blood which is quite incidental and due to schistosomiasis

In some parts of the tropical world up to 75 per cent of the schoolboys have blood in the urine due to schistosomiasis Other causes of blood in the urine which are quite incidental apart from the injuries may also have to be considered The methods of dealing with injuries of the kidneys due to stab wounds and bullet wounds are likewise determined by the severity of the symptoms and the

URINARY TRACT INJURIES

Any of the four main anatomical subdivisions of the urinary tract may be injured—the kidneys, ureters, bladder or urethra Injuries of any of these structures occur rarely as a result of extension of inflammatory or neoplastic processes, but these will not be considered here The type of injuries which are under consideration are those of misadventure following surgical technique and those which are the result of violent accidents Considering first surgical misadventure, it can be stated that injuries of the kidney of this type are exceptionally rare The kidney is deeply placed within the abdomen and being extraperitoneal in position seldom comes directly into the operative field of surgical procedures In undertaking a right hemicolectomy, however, the right kidney and ureter, enveloped in areolar tissue, come into the floor of the operative field, as well as the second part of the duodenum Care must be exercised to clip deeply seated blood-vessels carefully and discreetly lest the pelvis of the kidney or upper part of the ureter should be injured on the right side Although the left kidney is seen during splenectomy it is unlikely to be injured, being extraperitoneal in position

In undertaking a lumbar sympathectomy, using a loin incision and an extraperitoneal approach, the ureter is clearly seen when looked for as a landmark in approaching the lumbar sympathetic ganglia The part of the urinary tract most likely to be injured during operative technique while working within the pelvic cavity is the lower end of the ureter The ureter, in its distal part, is much more likely to be injured on the left side than the right side The injury is seen almost exclusively in female patients during gynæcological operations

Caution must be exercised during abdomino perineal excision of the rectum in male or female patients when working from below This operation is seldom undertaken in African patients Care is also essential when a rectal " pull through " operation is being performed on the rectum as it is necessary to undertake extensive freeing of the sigmoid rectum when this operation is undertaken for disease in the middle or upper third of the rectum A suspected injury of the ureter is best investigated by intravenous pyelography if complications arise, not at the time of the operation, but subsequently, some days later If results are not conclusive by this method cystoscopy following the intravenous injection of 4 c c of 0 4 per cent solution of indigo-carmine will give an indication as to whether dye is coming through both ureteric orifices or not An intravenous pyelogram may also in some cases be useful if X-ray facilities are available

If an injury of the ureter is sustained during any surgical procedure it should be repaired immediately and the area drained If a tumour in the pelvis involves the ureter this tube may have to be cut across intentionally and subsequently rejoined This is not an unduly difficult procedure and the ureter heals very quickly

The kidney is the part of the upper urinary tract which is most likely to be injured following falls, stab wounds and bullet wounds No cases of injury of ureters have been noted as a result of violent trauma of the non-operative type In almost all cases of injury of these structures it is easy to get a history of an

of some sort—a wall, partition or the edge of a lorry Urethral injuries also occur frequently following fracture of the pelvis *Rupture of the bladder and rupture of the urethra* will be considered together to avoid repetition Urethral injury or rupture of the bladder occurs in about 10 per cent of cases of fracture of the pelvis Fracture of the pelvis is a very common accident in the large towns and from main motor roads of tropical countries, where mass transport by lorry is employed so freely It is important to decide whether the injury of the lower urinary tract is anterior to the triangular ligament of the pubic arch, posterior to the triangular ligament or in the bladder in the extraperitoneal or intraperitoneal position These are the four clinical subdivisions which require differentiation, the methods of diagnosis and treatment differing with each of these parts injured

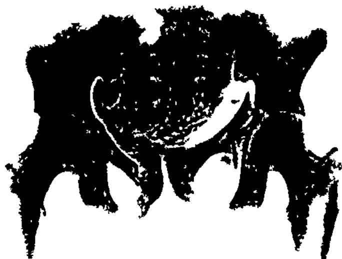


FIG 101
Radiograph of fractured pelvis with ruptured posterior urethra
Note incidental calcified guinea worms present

The patient is usually brought into hospital with multiple injuries There is an obvious fracture of both rami of the pubis on one or both sides of the pelvis (Fig 101) There may be extensive bruising of the perineum *It is typical* in cases of injury of the urethra to find blood at the anterior urinary meatus In almost all cases of injury of the lower urinary tract the patient cannot pass urine whether the rupture is incomplete or complete If the urethral rupture is incomplete there is usually marked bruising or swelling about the perineum which in itself causes retention of urine It should be appreciated that most of these cases are suffering from marked shock, and investigation requires great care to avoid precipitating fatalities If blood is found at the external urinary meatus the patient should be treated for shock, given a sedative and prepared for the theatre Blood should be taken immediately from the arm for blood typing and cross matching with that of the relatives An immediate X-ray of the pelvis is an advantage *Following preparation of the abdomen* the patient should be sent

early progress of the case The possibility of associated injuries of other structures may influence the procedures undertaken If doubt exists as to the possibility of there being a ruptured kidney plus rupture of some intra abdominal structure such as the spleen, a laparotomy should be undertaken and if the kidney is badly damaged it can be removed by the transperitoneal route If a gunshot pellet lodges within the kidney substance it may give rise to an abscess Penicillin and antitetanic serum should be given in such cases

Injuries of the lower urinary tract, the bladder and urethra are seen much more commonly in the tropics than in non tropical areas of the world Rupture of the bladder may occur due to filling it alone, where fluid is put into the bladder for cystoscopic examination of cases of carcinoma of the bladder associated with schistosomiasis The bladder capacity in cases of carcinoma has been found to be much below normal, and with an extensive growth with gross secondary infection it may be quite dangerous to fill the bladder beyond 8 oz Cystoscopes themselves used with reasonable care seldom injure the bladder as the position of the point of the cystoscope is usually apparent, by a sense of touch, when the point of the instrument has gone through the prostatic urethra Instrumental injury of the bladder is more likely to occur in patients who complain that they " cannot pass urine " and suspect that they have a urethral stricture, but in fact are suffering from strangury secondary to a chronically inflamed prostate with basal cystitis The bladder is empty, as they repeatedly pass about a teaspoonful or two of urine If a sound is passed in a case of this sort with a very reduced bladder capacity the inflamed wall of the bladder may easily be perforated by the point of the sound when it is passed to its full length The accident is much more likely to happen if a small sound is passed initially in the belief that the patient has a urethral stricture It is much better when passing sounds to start with a medium-large size to see how far it will go before using the small sizes The urethra is easily damaged by the passage of a sound in a case where there is a marked urethral stricture present and considerable force is used without adequately controlling the thrust by support of the forearm on the operator's own crest of ilium or other suitable position The technique of passage of sounds in cases of urethral stricture has already been dealt with

Circumcision undertaken by unqualified persons without due caution sometimes results in damage to the ventral part of the anterior urethra, adjacent to the external urinary meatus A urinary fistula of this type is difficult to close If the fistula is within 1 cm of the normal position of the external urinary meatus it is probably best to divide the bridge of skin using a cautery of some sort A patient is much less worried by a first-degree hypospadias, even if of traumatic origin, than by a urinary fistula close to the termination of the urethra Following the use of the cautery sufficient tissue is removed on both sides to leave a clear groove-like passage Injudicious circumcision seldom causes a urinary fistula at a more proximal position along the urethra

Rupture of the bladder may be due to pellet wounds and stabbing injuries by knives Most cases of rupture of the bladder are seen following lorry accidents or railway, shipping and mining accidents Injuries of the perineal urethra are almost invariably due to violent injuries where the patient falls astride a barrier

suprapubic cystotomy is indicated, with the insertion of an indwelling catheter in addition to act as a urethral splint during healing In cases of extraperitoneal rupture of the bladder a suprapubic cystotomy is indicated, but it is not necessary to leave a urethral catheter in position It is in fact a disadvantage If there is an intraperitoneal rupture of the bladder as indicated by a free escape of fluid from the bladder when introduced through a catheter a full laparotomy is essential The peritoneal cavity is washed out with saline and the rent in the bladder systematically closed An extraperitoneal suprapubic cystotomy is then undertaken and the peritoneal cavity is closed with drainage The lower part of the wound is lightly closed in order to permit of some drainage from the perivesical tissues

In some centres diagnosis of intravesical rupture of the bladder is made by insertion of a catheter into the bladder per urethram and an injection of 200 c c of 10 per cent sodium iodide put through the catheter An ampoule of uroselectan can also be used, being added to 6 oz of water and put through the urethral catheter An X-ray photograph is then taken of the lower abdomen If the urinary bladder is unruptured a spherical cystogram shadow of the bladder is seen, indicating that no intraperitoneal rupture has taken place If an intraperitoneal rupture has taken place the opaque solution will enter the peritoneal cavity freely and will cause an indiscrete fogging of the whole lower abdomen due to escape of the fluid from the bladder It is agreed by all authorities that suprapubic cystotomy is necessary for early deviation of the urinary stream in all cases of complete rupture of the urethra and in cases of extraperitoneal and intraperitoneal rupture of the bladder following repair of the latter

The method of inserting the urethral catheter is one which differs between different workers The teaching of the French school of surgery in the past was that patients with severe lower urinary tract injuries were usually too ill to permit of any operation other than the most limited surgical procedure for the deviation of the urinary stream A suprapubic cystotomy alone was therefore undertaken No attempt was made to deal with the ruptured urethra at the first operation There is much to be said for this teaching If, however, the ruptured urethra is not dealt with by urethral catheter splint within the next forty-eight hours there may be great difficulty traversing this channel by any means at a later time Undoubtedly many patients have been killed by prolonged operations being undertaken on them when they were in a very shocked condition Only limited surgery in many cases is therefore justifiable The patient is then allowed to recover from shock, and is given a blood transfusion, rest and sedatives The urethral injury is then dealt with after forty-eight hours The second operation should not be unduly deferred To undertake an open perineal operation immediately following suprapubic cystotomy in a very shocked patient is undoubtedly an extremely dangerous procedure

Bank's method of traversing the urethra (using an anterior Lister's sound in the urethra and a posterior sound passed in the retrograde direction and opposing the points as a means of facilitating the entrance of the anterior sound into the torn-off posterior part of the urethra) is an extremely difficult manœuvre The heads of the sounds although opposed slip away from each

to the theatre If there is no fracture of the pelvis present it is unlikely that there is an extensive internal hæmorrhage present about the extraperitoneal tissues of the pelvis If there is a fracture about the pubic bones, involving the upper and lower ramus on one or both sides and permitting of movement of the front of the pubis there is very likely to be extensive internal bleeding from tearing of veins about the brim of the pelvis In view of the extensive hæmorrhage which is invariably present in these cases, with this type of fracture, a blood transfusion should be arranged as early as possible

An attempt should be made in the theatre to pass a rubber urethral catheter under the strictest possible aseptic precautions If there is a complete rupture of the anterior or posterior urethra the catheter will definitely not pass If there is only a partial rupture in either of these two positions the catheter will probably pass into the bladder following a slight resistance at the site of the injury If there is an extraperitoneal rupture of the bladder alone the catheter enters the bladder easily, but only a small quantity of bloodstained urine is withdrawn If the urine is bloodstained and well mixed there is invariably an extraperitoneal rupture of the bladder present This rupture occurring below the position of the peritoneal reflection from the bladder is found to be usually at the position where the bladder wall joins the top of the prostate A tear in this position permits of extravasation into the periprostatic tissues in the pelvis If there is no bladder injury it is usually found that a drop or two of blood first leaves the catheter and this is followed by a large quantity of clear urine, the blood having come from the urethra at the position of a partial rupture With the initial rush of urine there is therefore a little blood, the remaining urine being clear To withdraw the urine in a divided specimen is sometimes helpful

When the rupture of the bladder is extraperitoneal fluid can be put into the bladder permitting it to be distended above the pubis, but when the urine is returned it is slightly but uniformly bloodstained Slightly less fluid returns than the amount of water put in If an intraperitoneal rupture of the bladder is present only a few drops of urine will be withdrawn when the catheter enters the bladder If saline is then passed through the rubber catheter a large quantity of sterile saline can be put through the tube, but it causes no apparent distension of the bladder above the pubis On releasing the catheter very little water returns as it has entered the peritoneal cavity through the vesical rupture If these tests are undertaken carefully there is very little difficulty in diagnosing partial and complete ruptures of the urethra or extraperitoneal and intraperitoneal ruptures of the bladder Each of the clinical entities gives rise to characteristic features on catheter examination

As more than one injury of the lower urinary tract is seldom present following accidents the catheter method admits of early and accurate diagnosis in most cases The catheter method is condemned by some, considering that it is liable to introduce sepsis The risks of other methods of diagnosis are equally high and not any more accurate A suprapubic cystotomy is not necessary in cases of partial rupture of the urethra below the triangular ligament A temporary indwelling catheter for forty-eight hours is usually sufficient in these cases If there is a complete rupture of the urethra either below or above the triangular ligament a

the urethra as the anterior sound *is withdrawn through the* urethra. The thread, now right through the urethra from the bladder to the anterior urinary meatus,



FIG. 103
Photograph illustrating position of engagement of ruptured urethra sounds.



FIG 104
Ruptured urethra sounds locked in position by points and handles

has a rubber catheter sutured to it. With the rubber now well oiled the catheter is drawn up the urethra into the bladder. The guiding thread is then removed By this means the ruptured urethra is easily intubated without opening the perineum. There is, therefore, no additional loss of blood and minimal added

other very easily Time may be lost and shock increased by this method being attempted

Having seen twelve cases of serious injury of the lower urinary tract in twelve months when working in a large port town and railway centre on the coast of West Africa, ample practice was afforded in trying various methods of intubating a ruptured urethra Ultimately a pair of ruptured urethra sounds (Fig 102) were made to a personal design by Messrs Allen & Hanburys Ltd of London The use of these sounds obviated the difficulty admirably and when using them an additional five minutes only is taken to insert a catheter through the ruptured urethra into the bladder This pair of sounds, anterior and posterior, are made to fit and lock together Each sound is made like a Guyon's urethral sound and

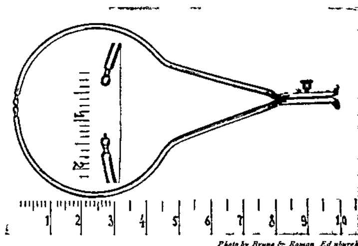


FIG 102
Ruptured urethra sounds Author s design

in such a way that a small point on the head of the posterior sound fits into a pit at the apex of the head of the anterior sound The two sounds are introduced, the posterior through the suprapubic bladder opening to the site of the urethral rupture and the anterior sound via the anterior urethra until the points come to the site of the urethral rupture The points can easily be felt touching each other The point on the posterior sound is fitted into the pit in the head of the anterior sound When engaging the sounds the two sounds should be at right angles to each other, this greatly facilitates fitting the heads together (Fig 103) When the points are engaged they can be kept together quite easily by slight pressure The anterior sound is then rotated and the handles approximated and locked together by special interlocking handles (Fig 104) When the sounds are locked together the pair of sounds is rotated in one piece, thus bringing the anterior sound through the damaged urethra into the bladder (Fig 105) The posterior sound is then removed and to the anterior sound, now protruding through the suprapubic wound, a strong thread is tied and then pulled through

Put otherwise as averages for clarity

Ruptured anterior urethra	42 cases	6 deaths	Mortality 14 3 per cent
Ruptured posterior urethra	10 cases	8 deaths	Mortality, 80·0 per cent.
Bladder ruptured, both types	11 cases	10 deaths	Mortality, 90 0 per cent

Mortality rate for cases in present series

Ruptured anterior urethra	1 case	No death	Mortality, nil
Ruptured posterior urethra alone	9 cases	3 deaths	Mortality, 33 3 per cent.
Ruptured bladder and posterior urethra	6 cases	3 deaths	Mortality 50 0 per cent

Since publication of these figures (1950) an additional twenty cases of lower urinary tract injuries have been dealt with It is obvious that a rupture of the urethra or bladder is a very serious injury The improved results in the personal series of cases dealt with are probably accounted for by the use of penicillin which would not have been available when the figures of Culp were published (1942) It is considered that the use of the special ruptured urethra sounds also contributed materially to the better results Anterior urethral ruptures are serious, posterior urethral ruptures are very serious indeed, and bladder ruptures are extremely dangerous to life All these cases require very careful consideration and prompt treatment The results of treatment are greatly improved by the use of a blood transfusion immediately on admission to hospital Attempts to repair a ruptured posterior urethra by the direct approach are considered impracticable, they add greatly to the patient's shock, and insertion of sutures is unlikely to be successful in view of the ragged nature of the ends to be joined and the extensive local damage and bruising present Anterior urethral ruptures are less serious and can be repaired by suture of the roof through a perineal approach, no urethral drainage being required It is considered that the use of medium fine polythene tubing as posterior urethral splintage gives better results than when rubber catheters are used It is less likely to cause irritation of the urethra and purulent discharge which predisposes to late stricture formation Medium calibre polythene tubing is not unduly rigid for this purpose Following healing of a traumatic rupture of the urethra some degree of stricture formation is almost inevitable It is desirable to leave the catheter splint in position for not less than fifteen days In some cases it may be necessary to keep the catheter in the urethra considerably longer Patients, not realising the danger of a post-traumatic stricture forming, usually neglect further treatment after they leave hospital They should be given specific instructions regarding the necessity of periodic post-operative dilatations of the urethra

In estimating a shocked patient's ability to stand operation before he goes to the theatre, his blood pressure should certainly be taken Great caution is necessary if the systolic blood-pressure is below 100 mm mercury A "tilt test" may be most useful—as referred to in Chapter 7—in estimating the degree of loss ... shock s[us]tained by the patient If a patient is very ... rtaken using local anæsthesia ... ese cases, as it tends to lower the blood-pressure further Intravenous barbiturate anæsthesia should never be used for these cases It is highly dangerous because of its tendency to lower the blood-pressure still further which in many cases is already at the basic minimum compatible with consciousness and life itself

shock About forty cases have been dealt with in this way in ten years Ruptured urethra is an extremely common accident in some parts of West Africa The method appears to be satisfactory

The mortality rate following injury of the urethra and bladder is high Many of the patients die within forty-eight hours from multiple associated injuries rather than from the ruptured urethra *per se* Referring to the records of Culp,[31] the following statistics are of considerable interest in this matter They indicate that the mortality rate is to a large extent influenced by the time at which the



FIG 105
Sounds passed through ruptured posterior urethra and rotated into bladder

suprapubic cystotomy is undertaken Quoting from a personal article on the subject (Bowesman [32]) Culp records mortality rates as follows

Anterior Urethral Ruptures (42 cases—6 deaths)

Operation, first day	Mortality, nil
Operation, second day	Mortality, 22 2 per cent
Operation, sixth to tenth day	Mortality, 33 3 per cent
Operation thirtieth day	Mortality, 100 0 per cent

Average mortality, 14 3 per cent

Posterior Urethral Ruptures (10 cases—6 deaths)

Operation, four hours or less	Mortality, 66 per cent
Operation, 3rd day	Mortality, 100 per cent
No operation	Mortality, 100 per cent

Average mortality, 80 per cent

Bladder Ruptures—Intraperitoneal and extraperitoneal types taken together (11 cases—10 deaths)

Operation two hours or less	Mortality, 100 per cent
Operation, twenty four to thirty six hours	Mortality 75 per cent.
Operation, seventh to ninth day	Mortality, 100 per cent
No operation	Mortality, 100 per cent.

legs, the uterine cervix in female patients and the eye in children There is also a high incidence of chorion epithelioma in most parts of the tropics amongst female patients In European patients resident in the tropics carcinoma of the bronchus should not be forgotten as a very elusive malignant growth, the secondary growths often being much more obvious than the primary One such case was invalided from West Africa in the belief that the case was one of carcinoma of the colon A carcinoma in the wall of the colon was present, also a tumour of the kidney, both were secondary to primary carcinoma of the bronchus as subsequently noted at autopsy

Congenital cystic kidney formation is almost invariably bilateral This is not a malignant condition, but it is necessary to consider the various enlargements when dealing with the possible diagnosis of renal malignancy The condition, like neoplastic conditions, gives rise to painless hæmaturia and a palpable swelling in the kidney area There are sometimes indications of early renal failure when the patient is first seen Optic disc changes may be noted in some cases Before deciding that a growth in the abdomen is in the kidney, it is essential to exclude other possible conditions giving rise to the mass

Guinea-worm cyst within the mesentery of the upper abdomen may cause great confusion as it is difficult to diagnose In parts of the world where guinea-worm disease exists it is always worth asking the patient if he has ever had guinea-worm disease about the leg, this being the most common site to find the worm under the skin The parasite causes a sinuous worm-like elevated area many inches long Guinea-worm cysts develop in the tissues, sometimes within the abdominal cavity, usually about two to four years after the initial guinea-worm infection was first noted Fig 22, Chapter 7, shows a guinea-worm cyst of the mesentery where renal tumour was considered as a possible diagnosis, but in the absence of blood in the urine a transperitoneal approach to the mass was used considering that some other form of tumour was more likely than a renal growth

In many parts of the world where hydatid disease exists renal echinococcosis should be considered in the case of renal swelling Antonio [31] reports such a case from the Philippine Islands, but notes that only 2 per cent of hydatid cysts occur within the kidney This is a relatively small number The nature of many renal abnormalities can be decided by the characteristic appearance given on intravenous pyelography A single discrete circular cyst might well suggest a renal hydatid cyst, and this in the presence of a positive Casoni skin test for hydatid disease would make the diagnosis almost certain A solitary kidney cyst may not necessarily be of hydatid origin Solitary cyst formation tends to follow thrombosis of veins within the essential tissue of the liver, kidney or pancreas, etc The investigation of renal abnormalities is greatly facilitated by intravenous pyelography This method of examination is indicated in all cases where there is a palpable mass within the kidney area of the abdomen and an attack of painless hæmaturia, some degree of anæmia and a persistent low-grade fever Cystoscopy helps in determining the side from which blood is coming as seen by inspection of the ureters

If intravenous pyelography is being undertaken in the tropics it should be remembered that in order to get a good picture, with a dense shadow of the renal

The patient must be nursed very carefully following operation where there is a fracture of the pelvis present, in order to prevent further injury to the urethra In the absence of very active movement this, however, is unlikely Pelvic binders have been used Water cushions or air rings have been used during convalescence as the amount of movement they allow does not interfere with healing of the pelvic fracture and they make the patient more comfortable

TUMOURS OF THE KIDNEY

The incidence of pathological conditions affecting the various systems of the body varies considerably from one part of the world to another It may also vary greatly between different social and racial groups living under very comparable conditions Malignant disease of the kidney or Wilms' tumour occurs with about equal frequency amongst children in all parts of the world, irrespective of their race This type of tumour is commonly seen in children in West Africa Hypernephroma or malignant disease of the kidney (carcinoma) has been seen on very few occasions in African adults Gelfand[33] indicates that tumours of the kidney are found not infrequently in South East Africa, although he is of the opinion that they are probably less common than in European patients It is likely that with the more limited facilities for diagnosis in most parts of the tropics, a false impression is gained that these conditions are less common than in fact they really are

Hospital statistics give a very fallacious impression of the true position in cases of malignant disease affecting parts of the body which are difficult to examine by direct methods Patients going to hospital with obvious advanced malignant conditions, considered to be quite inoperable, often leave hospital inadequately investigated The diagnosis under the circumstances may be very inaccurate It is probably true to say that malignant tumours of the kidney in African adults in West Africa are less common than in European adults in Europe When the term " tumour " is used in reference to any form of enlarged kidney, irrespective of the nature of the pathology causing the enlargement, then it can be said that kidney tumours are not very infrequently seen Most of the cases of enlargement of the kidney seen personally have been due to inflammatory conditions, pyonephrosis secondary to ureteric obstruction with infection present Enlargement of the kidney may be seen in association with a hydronephrosis of large size In some of these cases there is no apparent infection present On rare occasions an enormous hydronephrosis has been seen giving rise to visible abdominal distension Enlargement of the kidney due to tuberculous pyonephrosis has been seen only on rare occasions Hydronephrosis secondary to an obstructed ureteric stone is not common in African patients of the negroid groups

If a growth is found in the kidney it should not be forgotten that it may be of a secondary type with a primary growth elsewhere in the body A primary growth should be looked for, taking into consideration the types of carcinoma most commonly seen in the particular part of the world from which the patient comes Carcinomata of particularly high incidence in African patients are those associated with the liver, the urinary bladder, the penis, the epithelium of the

EXTRACTS

Renal Investigations and Functional Efficiency Tests

1 In health there should be an excretion of urine up to 1,500 c c in twenty-four hours or over Specific gravity should reach anything up to 1,020 with no sugar present

2 If renal function is good some shadow should be cast in intravenous pyelogram ...

... where blood urea examinations cannot be undertaken but X-ray facilities available ...

5 ...
the dye ...
the urete...
If given ...
from the ureteric orifices into the bladder using the cystoscope Advise passing the cystoscope before the dye is injected

6 Methylene blue can be used as indigo-carmine but the results are not entirely reliable, as in some patients the dye is excreted as a colourless solution while in others a greenish blue colour is noted Its use is not advised The dye if excreted in visible form appears thirty minutes after intramuscular injection

7 Residual urine in the bladder occurs in late cases of prostatic obstruction If 5 to 6 oz are present it can be taken that there is some dilatation of the upper urinary tract and this is often associated with urinary tract infection (Presumptive)

8 Rosenthal's renal function test by specific gravity readings (1914) Collect two-hourly urine specimens by day from 8 A M until 10 P M and bulk night specimen from 10 P M to 6 A M Bulk night specimen should not exceed 400 c c if kidney function is good Fluid should be taken with meals during the test but not between them ...

(a) A lowering of the maximum specific gravity below 1,018
(b) Fixation of the specific gravity, variation being less than nine points.
(c) Nocturnal polyuria greatly exceeding 400 c c in volume

9 Alternative method of undertaking the specific gravity test

The patient is taken off fluids by mouth at 6 P M
At 8 A M the patient is given 1,000 c c of water to drink Urine passed during the next four hours should be up to 800 c c if kidneys are good
The morning specimen collected overnight should have specific gravity up to 1,025
With the morning diuresis the specific gravity should fall as low as 1,002 to 1,005
Urine specimens are collected half-hourly and specific gravity noted.
If renal function is poor, specific gravity tends to remain about 1,010, fairly constant

10 Phenolsulphonphthalein test (P S P) (1910) Non-irritant and non-toxic

(a) Empty bladder, drink two glasses of water (400 c c)
(b) Give 1 c c of the dye intravenously half an hour later Collect specimens of bladder urine for total test at ten minutes, sixty minutes, and 120 minutes and estimate percentage excretion by colorimeter Ninety-five per cent of the dye should be excreted within two hours Five minutes is allowed for the dye to start coming through the kidneys

In the divided test, where urine is taken from the individual kidneys through ureteric catheters, urine collected in individual test tubes containing 10 per cent NaOH when the dye starts to come

calyces, it is essential to stop the patient taking any water at all by mouth for twelve hours before the photographs are taken, otherwise the concentration of the opaque medium is insufficient to cast a good shadow Patients in the tropics tend to drink very large quantities of water by option In the case of renal tumours the characteristic appearance of the renal calyces is that one half of the kidney tends to show normal calyces while the other half shows abnormal calyces with a marked distortion of the pelvis If intravenous pyelography does not give satisfactory pictures a retrograde pyelogram should be undertaken using either 15 per cent sodium iodide or half-strength uroselectan or other preparations made for the purpose The method of introduction of air into the perinephric tissues under pressure followed by X-ray photography has not been tried Renal arteriograms to show the distribution of the blood vessels have also not been tried Bolan's blood slide test for altered serum proteins may be helpful There is an increase in urinary gonadotrophin as in the case of any form of malignancy The appearance of hydronephrosis in pyelogram films is very characteristic Where it is a closed hydronephrosis very little of the opaque medium may be excreted by the kidney on that side If the function of a kidney is below 25 per cent uroselectan does not cast a shadow in the photographs, insufficient radio-opaque iodine being secreted to cast a shadow A straight X ray photograph should be undertaken initially before a pyelogram is done as it is very helpful to see if a good normal kidney shadow is cast, the two sides can be compared

A Wilms' tumour of the kidney in a child is unfortunately commonly seen in the tropics The prognosis is extremely bad as the children are brought to hospital at a late stage The tumour is extremely difficult to remove complete On opening into the kidney area a pultaceous mass of material, like brain substance, is encountered which is easily broken It is not held within a discrete capsule, and is therefore impossible to remove completely Some of these patients get over the immediate operation, but are discharged from hospital in very poor [illegible]

routine procedure, greatly facilitates the operation, particularly for those with limited experience The rib being removed subperiosteally is regenerated again after a few months With a better view of the kidney the operation is made much easier and there is a smaller risk of hæmorrhage due to better access

If a kidney tumour is not large and there is evidence that the other kidney is functioning normally the kidney should still be removed complete Partial nephrectomy is very liable to complications and is not advised Suprarenal tumours may sometimes give rise to difficulty in diagnosis They occur most commonly in young female patients giving rise to a degree of virilism and hirsuties or excess of body hair If a suprarenal tumour is found it is sometimes easier to remove the suprarenal gland and the kidney together than the suprarenal tumour alone as the two may be closely adherent The suprarenal tumour alone should be removed if this is possible

II

Genito-urinary Diseases in the Female

VULVOVAGINITIS WITHOUT ULCERATION

THE implications of genito-urinary diseases in female patients involve many systems, although the initial manifestations are in a high proportion of the cases located about the lower genito-urinary tract Various conditions are grouped together in such a way as to produce a convenient sub-heading which will collect together conditions with a somewhat comparable symptomatology "Vulvovaginitis without ulceration" is a convenient classification for the first group of conditions to be considered The anatomical configuration of the lower genito-urinary tract in female patients predisposes to inflammatory conditions to a greater extent than in the male patient Some conditions reach the lower genito-urinary tract by way of the blood stream and not by local spread There are many inflammatory conditions of non-venereal origin Vulvovaginitis may be associated with glycosuria The necessity of testing the urine for sugar is obvious The use of clinistix test strips for the detection of sugar is very convenient It is necessary only to dip the small strip of firm paper into the urine and see the colour change produced if there is sugar contained in the urine The Ames urine testing outfit for detection of the various abnormalities in urine associated with disease is easy to use, efficient and time-saving (see Extract appended)

Glycosuria is most common in the older age groups of patients over the age of 40 In patients over the age of 50 there may be a marked lowering of sex hormones with the production of kraurosis or a dry, desquamating, vulvovaginitis causing local irritation and constitutional disturbance due to loss of sleep as a result of these changes Both glycosuria and kraurosis give rise to pruritus of the vulva They may occur singly or in combination Glycosuria is treated by regulation of diet in mild cases In the more severe cases insulin injections in addition may be necessary Kraurosis is much improved by the use of stilbœstrol in tablet form by mouth Small doses over a prolonged time give the most satisfactory results Adequate local cleaning with the application of soothing lotions is an advantage Patients in the tropics with sugar in the urine often comment on the large number of ants which come to the urine in the container into which the urine has been passed during the night If this is noticed, almost invariably sugar is present in the urine

Leaking of urine for any reason, stress incontinence, or vesicovaginal fistula predisposes to perpetual urine soaking of the vulva and an ammoniacal dermatitis locally Multiple small encrusted areas occur and the persistently damp condition of the local skin gives rise to marked thickening and irritation In extreme cases

through the ureteric catheter into the NaOH solution, there is a red coloration produced After colour noted, collect new specimens at ten, sixty and 120 minutes The excretion rate for the individual kidneys is then estimated

The combined estimates at 10 minutes should be 10 to 15 per cent of total dye
The combined estimates at 60 minutes should be 50 per cent of total dye
The combined estimates at 120 minutes should be 95 per cent of total dye

If more is passed in the second hour than in the first hour, it suggests poor renal function of the side involved

REFERENCES

1 WILSON RAE, A M (1951) Venereal diseases in British Colonies *Brit J vener Dis* 27, 118
2 WILLCOX, R R (1956) Prevalence of veneral diseases in British West Africa *W Afr med J* 5, 103

J 68, 99
6 ACOSTA-SISON, H (1958) Treatment of condyloma acuminatum *J Philipp med Ass* 34, 301
7 HELMAN, J (1957) Some diseases amongst Hottentots of South west Africa *Cent Afr J Med* 3, 143
8 WILLCOX, R R (1956) Management of gonorrhœa in the European and African *Cent Afr J Med* 2, 295
9 MAYNE, G (1955) Urethral stricture in the male *Brit J vener Dis* 31, 98
10 FAIN, A & FALAISE, A (1957) Calculose vesicale et avitaminose A chez enfants de Ruanda-Urundi *Ann Soc belge Med trop* 37, 135
11 DAS, K (1957) *Clinical Methods in Surgery*, 5th ed p 5 Calcutta City Book Co (Hilton)
12 FERRIS, D O (1957) Enlargement of the urinary bladder with a segment of ileum *J Urol* 77, 826
13 LUND, H G *et al* (1954) Gross hæmaturia in sickle cell disease *J Urol* 71, 151
14 HONEY, R M & GELFAND, M (1957) Chronic Brucella pyelonephritis with calcification *Cent Afr J Med* 3, 465
15 EDINGTON, G M (1957) Schistosomiasis in Ghana with special reference to its pathology *W Afr med J* 6, 45
16 HONEY, R M (1956) Ileo cystoplasty in chronic bilharzial cystitis *Cent Afr J Med* 2, 1
17 THOREK, M (1944) *Modern Operative Technique*, p 1927 Philadelphia Lippincott
18 GRAY, TURNER (1943) *Modern Operative Surgery*, 3rd ed , p 2118 London Cassell
19 GREGORY, I L (1955) Fournier s gangrene *Brit J Urol* 27, 116
20 CAMPBELL, J C (1955) Fournier's gangrene *Brit J Urol* 27, 106
21 VAN VEEN, A G (1950) Bongkrek acid—a new antibiotic *Docum neerl indones Morb trop* 2, 185
22 BOWESMAN, C (1940) A short report on the use of 4 4 diamidino stilbene in the treatment ... 17
23 ... tic agents on mycetomas and
24 ... in the etiology of funiculo-... ner *J trop Med Hyg* 6, 739
25 ... hagas s disease *Docum med*
26 ... ome ova in the genito-urinary tract of subjects of bilharziasis *Trans roy Soc trop Med Hyg* 47, 218
27 VAN BEUKERING, J A & VERVOORN, J D (1956) Sterility in an African *Docum med geog trop (Amst)*, 8, 61
28 BURKITT, D P (1951) Primary hydrocele and its treatment *Lancet*, 1, 1341
29 CORLETTE, C E (1948 ... Wright
30 MILLIN, T J (1947) ... one
31 CULP, O S (1942) ... 48, 266
32 BOWESMAN, C (1950)
33 GELFAND, M (1957) ... ita
34 ANTONIO, D (1955)

age group of patients Confirmation of these suspicions is obtained by examination of curettings from the uterus

Tuberculous endometritis gives rise to leucorrhœa The patient is usually ill with other more generalised tuberculous infection involving the Fallopian tubes and in some cases the peritoneal cavity, the lungs are almost invariably infected also Tubercle bacilli can sometimes be found in curettings of the uterus by smear examination or on section and appropriate staining Very few cases of this type have been noted in African patients Tuberculous disease of the genital organs in female African patients is not common in West Africa in spite of the comparatively high incidence of pulmonary tuberculosis in the large towns

There is no doubt whatever that schistosomiasis may give rise to a seropurulent discharge from the vagina The investigation of Gelfand and Ross[1] shows that schistosome ova were found in the vaginal walls in 81 3 per cent of female patients with schistosomiasis, the uterine cervix was infected in 75 per cent of the cases, the uterus in 59 2 per cent of the cases These positions are all accessible to examination of secretions and it will be found that if secretions removed from the upper vagina with a teaspoon and the material then put through the process of suspension in 0 5 per cent solution of glycerine, the ova of schistosomes can be found on concentration in a fair proportion of the cases In any district where schistosomiasis is present patients with vaginal discharge should have their urine examined initially for schistosomiasis If this is negative local secretion should be separated and concentrated for microscopy The incidence of schistosome ova in the vaginal wall and the bladder wall in schistosome patients is almost equal, both being over 80 per cent Schistosome ova may also be found occasionally in curettings from the uterus Washing and concentration is necessary to ensure positive results

Coliform organisms can be found in most instances in vaginal discharges These organisms are not necessarily pathological

Fungus infections about the vagina are very common indeed in female patients in the tropics Roda,[2] reporting from the Philippine Islands, noted fungoid infections of the vagina and rectum in 60 per cent of patients there The incidence of fungoid conditions about damp areas of the body is markedly increased by the use of the tetracycline group of antibiotic drugs, and during pregnancy Cleanliness or lack of cleanliness about the vulva and vagina are much influenced by social custom The necessity of adequate pre-operative preparation of this area in female patients is particularly necessary in the case of European patients Associated with fungoid conditions of the vagina and skin about the pubis a heavy infection of spirochætes and fusiform bacilli almost invariably occurs in the tropics Removal of pubic hair is essential in treatment Adequate bathing is necessary and daily application of 1 per cent biniodide of mercury in spirit, though initially rather painful, is very satisfactory in clearing up these infections, it should be followed by the free use of antiseptic dusting powder Intravenous injection of Novarsenobenzol rapidly improves the spirochætal infection The use of an antibiotic called Mycostatin has been advocated by Roda but this has not been used personally A local application of gentian violet well applied, under

there is often some ulceration produced secondary to scratching of the inflamed areas The many complications caused by childbirth will be dealt with in a separate chapter

Trichomonas vaginalis infection is very commonly seen in female patients in the tropics The organism is easily detected on microscopic examination of vaginal discharges in infected patients The organisms may also be found in stool specimens Adequate local bathing and douching are beneficial Application of stovarsol vaginal compound has been advocated for treatment, but this has not been found very satisfactory Treatment with weak mercurial solutions appears to be much more effective Mercuric phenyl acetate cream such as Volpar cream stops the infection very quickly as the substance has a very high protoplasmic poisonous effect The cream is non-irritant to the local tissues Whereas mepacrine tablets in full courses are used in male patients, who are occasionally affected by a urethritis due to *Trichomonas vaginalis* infection, this drug by mouth has not been used in treatment of female patients with this type of infection A local application would appear to be more satisfactory Infection with this organism is not uncommon in young female patients under the age of 12 years Vaginal discharge in female children may be due to threadworm infections The worms migrate from the anal canal into the vagina They give rise to a thin watery discharge and some degree of pruritus Threadworms are easily treated with piperazine preparations and it is advised that if a leucorrhœa occurs in young female patients in the tropics without other obvious causes stool specimens and skin swabs should be examined for threadworm ova Microscopic examination of cellophane swabbings from the perianal skin is the most effective method of detecting threadworm ova If the infection does not clear up completely following the use of piperazine preparations a vaginal douche using quassia solution through a rubber catheter is beneficial

Pneumococci can be found not infrequently on examination of vaginal swabbings in female children and adolescent patients, they do not appear to be necessarily very pathogenic, though they give rise to some degree of local irritation The condition is best treated by giving a course of sulpha drugs accompanied by local bathing with weak antiseptic solutions, such as Dettol Pneumococcal peritonitis is usually due to a blood borne infection and not necessarily due to spread of infection via the lower genital passages It occurs in male and female patients, more often in the latter

Diphtheria infection of the vagina has been seen on only one occasion in a patient in the tropics who died of diphtheria The patient was admitted to hospital in a moribund condition In small country hospitals anti-diphtheritic serum is very unlikely to be available for treatment when required, as it is so seldom used that it becomes outdated It should be remembered that chloromycetin is very effective in the treatment of diphtheria

A low-grade chronic vaginal discharge is sometimes due to chronic inflammatory disease within the pelvis A bimanual pelvic examination is therefore necessary in these cases Vaginal discharge occurs in cases of incomplete abortion If a discharge is slightly bloodstained or dark brown in colour it should suggest the possibility of malignant disease of the body of the uterus, particularly in the older

superior to an open dissection The same method of treatment can be applied to a Bartholin's abscess The pus escapes and if necessary the abscess cavity can be washed out with saline a few days after the initial drainage by diathermy puncture If a Bartholin's abscess is incised and drained the wound will close in due course but the abscess may reform If the diathermy method is employed for evacuation continued drainage is ensured

Cystitis is seen more commonly in female patients than in male patients The short urethra predisposes to greater liability to ascending infection with *Bacillus coli* Schistosomiasis as an underlying cause of cystitis in the tropics must be kept in mind Sulpha drugs are most useful in the treatment of cystitis, but it is desirable to give two courses of one week's duration with an interval of two weeks between them to ensure a satisfactory result Chloromycetin appears to be more effective in the treatment of cystitis of coliform origin than penicillin or streptomycin Cystitis is on rare occasions associated with a stone in the bladder Vesical calculi are not common in African patients except where the bladder has been opened by suprapubic cystotomy, or following local repair of vesicovaginal fistula If cystitis does not clear up completely following treatment a cystoscopic examination should be undertaken to see if there is an obvious cause which remains as a source of residual infection Abnormalities about the ureteric orifices or ulceration of the bladder or signs of schistosomiasis may indicate the underlying cause of the continued cystitis

Diverticulum of the bladder in female patients is not common as it is usually associated with urinary obstruction of some sort Urinary obstruction in female patients is rare apart from those cases where there has been ulceration about the urethra due to lymphogranuloma inguinale In such cases there is sometimes only a pinhole urethra with marked intravesical back pressure A self inserted foreign body in the bladder has never been seen acting as a cause of cystitis in any African female patient

Pyelitis and other upper urinary tract infections differ little in male and female patients and investigation and treatment should be along the same lines as already described If in a female patient however a pyelitis does not clear up well, it may be a great advantage to give a course of stilbœstrol in addition to sulpha drugs This has a beneficial effect, particularly in patients over the age of 40

ULCERATION OF THE EXTERNAL GENITALIA

It is convenient to discuss the various forms of ulceration about the female external genitalia as a clinical group of conditions, although the nature of the ulceration may vary greatly One is frequently confronted with this situation as a clinical problem Many of the standard descriptions of ulcerative conditions about the vulva and vagina do not accord closely with the actual findings as seen in surgical clinical practice in the tropics It is proposed therefore to discuss various types of ulceration in the light of actual cases seen rather than make an attempt to comply with the standard descriptions which would appear to be copies from one book to another, but which are in many instances undoubtedly incorrect

an anæsthetic, is usually effective in clearing up the condition, and with adequate washing and cleaning the condition is arrested quite quickly

Gonorrhœal infection accounts for a high proportion of cases of leucorrhœa in female patients The organisms, Gram negative intracellular diplococci, grow freely on secreting surfaces and in these places they are most easily found—the mucous membrane of the urethra, the lining of the cervical canal of the uterus and from the lower rectum Gonorrhœa is contracted almost exclusively in adults as a venereal infection Infants may develop gonorrhœal conjunctivitis at birth during vaginal delivery from the mother who is infected Young children in the tropics both male and female are occasionally found to have a gonorrhœal infection which is undoubtedly due to non venereal contamination from infected adults In adults, following exposure to infection, vaginitis occurs four to seven days later —there is dysuria, frequency of micturition and an increasing vaginal discharge When examining patients suspected of having the condition, the urethra should be swabbed clean and the flat end of a silver probe inserted into the urethra in order to withdraw a small amount of purulent secretion which is stained and examined under the microscope Intracellular Gram negative diplococci can be found in the absence of treatment in a high proportion of the cases during the first two to three weeks of the infection, at a later stage they are much more difficult to find The organisms can also be found in pus from the endocervical canal of the uterus

Gonorrhœal proctitis is not uncommon in female patients, although seen much less frequently in recent years since the introduction of the sulpha group of drugs and the antibiotic preparations The para urethral glands become infected Bartholin's glands are often infected and an abscess may also occur In these cases a mixed infection is usually responsible Following the infection of the gland the duct frequently becomes obstructed, this predisposes to the development of a Bartholin's retention cyst The cyst may become of large size producing a spherical mass of 1 to 2 in diameter The gonorrhœal infection must be treated, local bathing is helpful and an alkaline bromide mixture by mouth makes the bladder and urethral discomfort much less at the acute stage Treatment by injection of 1 million units of long acting penicillin gives good results in more than 90 per cent of the cases The desirability of tracing the infected contact is obvious and appropriate treatment also instituted where possible

In dealing with a Bartholin s cyst, removal by dissection is not advocated, as the nature of the local tissues predisposes to gross local swelling Hæmatoma formation often follows the operation Healing is slow and painful Much the best method of dealing with the condition is to make a new opening into the cyst in the estimated position of the normal duct using a diathermy apparatus, or if not available in country places, an actual cautery An anæsthetic is necessary for the procedure By this method a new duct is formed The lining of the cyst and the vaginal skin join and reconstitute a permanent new entrance to the gland, permitting of the escape of normal secretion This method ensures rapid and efficient treatment and the gland, which is of functional value, is retained The procedure has been used personally on many occasions and is considered vastly

patient The condition in the female is *unilateral and not bilateral* The mass in the female changes abruptly from keloid type of tissue to normal skin at the position of its attachment to the major labium The mass is quite unlike a filarial condition which pits on pressure Microfilaria embryos were not found in the blood or tissues of either of these patients, though this is not necessarily very *important* Fig 108 shows the same patient following excision of the mass Like keloids elsewhere in the body there is a marked tendency to recur following excision It is *maintained that this condition* is a direct complication of ulceration of the vulva, with involvement of the deep fatty layers and subsequent keloid formation The constancy with which the history of a *boil* is given as being the precipitating cause of the condition is very conspicuous and significant This is quite unlike the manner in which an elephantiasis of any part starts The seriousness of this condition illustrates the importance of adequate and early treatment of septic *infections of hair follicles about the vulva* in patients with pigmented skin who are so prone to keloid formation



Fig 108
Same case as Fig 107 following excision of mass

Another condition which is incorrectly termed elephantiasis of the vulva is keloid formation of the lesser labia (Fig 109) and this is invariably due to lymphogranuloma inguinale A comparable condition occurs in the scrotum in male patients with lymphogranuloma inguinale affecting the scrotum (Fig 110) Normally, following incisions in the skin of the penis or the scrotum, keloid formation does not occur—neither of these structures contains any fat, which is histologically a characteristic of these parts As keloid formation is closely associated with the presence of *decomposing fat in the wound in patients with pigmented skin* one might not expect keloid formation to occur in this position If, however, the infection is one of lymphogranuloma inguinale there is involvement of sucutaneous lymphatic tissue which breaks down as it proceeds from the area of the primary sore to the groin, the lymphatics of the lesser labia and about the clitoris drain into the groin glands This *deep-seated suppuration permits of a leak back of fat into the lesser* labia area thus supplying the necessary factors for keloid formation Where there is a pure incised wound of the lesser labia or clitoris, as following native circumcision or clitoridectomy, keloid formation does not occur, the tissues being healthy Female circumcision is performed as a native ritual in many parts of

Few if any doctors will affirm with certainty that they have seen cases of elephantiasis of the vulva which are in any way comparable to elephantiasis of the scrotum in male patients If a very accurate history is taken of a patient who is found to be suffering from a large pendulous mass about the vulva popularly called elephantiasis it will be found in all cases that the condition started initially as a boil or ulcer of the hairy area of the major labium on one side in its upper part, the subcutaneous fatty layer of tissue becoming involved with a condition comparable to a carbuncle Following healing there is a typical keloid formed very like that seen at the lower end of a suprapubic midline incision which encroaches on the pubic pad of fat Fig 106 shows an early case of this condition where one year earlier a girl aged 13 years suffered from a boil of the left side of the vulva about the major labium Following healing a keloid like mass developed



FIG 106



FIG 107

Fig 106—Early keloid of vulva following a boil of major labium
Fig 107—Advanced keloid of vulva following a boil of major labium.

and in this way the condition started It is a keloid tumour and not an elephantiasis of filarial origin at all Fig 107 shows a case of a similar though more advanced condition in a woman of about 30 years of age This swelling too started as a boil of the major labium ten years earlier The mass grew progressively until it reached the large proportions seen in the illustration An infection of the major labium of this type giving rise to ulceration is therefore an extremely serious condition It is a type of ulceration seldom mentioned in surgical textbooks and it emphasises the importance of dealing with pimples and boils in this area of the body in female patients promptly and efficiently before the infection perforates into the underlying fatty layers

The following points will be noted in these cases The origin of the mass is from the major labium only The scrotum of the male is personally believed to be represented in the female subject by the lesser labia and not the major labia as popular opinion suggests This mass in a female patient is therefore not in the same homologous position as an elephantiasis of the scrotum in the male

Rectal stricture is a very typical complication of late cases of lymphogranuloma inguinale in some female patients It does not occur in all the cases and is determined largely by the site of the initial sore Where inguinal ulceration does occur in female patients following a sore about the lesser labia the ulceration is placed more medially than that seen in male patients The process is essentially the same In examining female patients at a later stage for evidence of old groin ulceration suggestive of lymphogranuloma inguinale, inspection should be made



Fig 111

Bridges of skin seen about vulva in case of *lymphogranuloma inguinale*

at a position close to the labiocrural fold rather than far out in the groin as is the case in male patients Perforations of the lesser labia are very typical of lymphogranuloma inguinale in female patients Similar perforations about the edges of the vagina may be noted farther down Fig 111 illustrates the typical bridges of skin which are found in this condition at a late stage With a subepithelial necrotic process going on, multiple skin perforations may be found

In some instances the rectovaginal septum breaks down giving rise to a rectovaginal fistula of lymphogranulomatous origin This form of genital ulceration is most serious Any attempt to repair such a fistula in the absence of adequate preliminary treatment for the basic condition predisposes to a marked increase

the tropics This operation though invariably accompanied by some degree of sepsis is rarely followed by keloid formation Keloid formation about the lesser labia is very typical of late cases of lymphogranuloma inguinale though it occurs in only a small proportion of lymphogranuloma inguinale cases where the primary sore was situated about that area

Lymphogranuloma inguinale is a venereal disease with a primary sore about the genital area A very small ulcer, which is not particularly painful, develops about five days after the infecting contact The ulcer, being small, not particularly painful and of short duration, is usually overlooked by the patient as being not

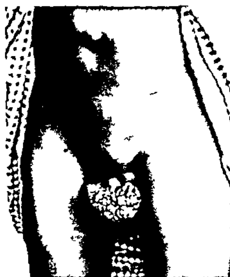




FIG 109 FIG 110

Fig 109—Keloid of lesser labium secondary to lymphogranuloma inguinale
Fig 110—Keloid of scrotum secondary to lymphogranuloma inguinale for comparison

serious and by the time the patient sees the doctor the ulcer has healed In many cases where bubo formation occurs the patient will admit that there was a small sore present for a few days some weeks ago This form of ulceration in female patients in the tropics may later precipitate keloid formation about the lesser labia which is very disfiguring and troublesome In male patients unilateral or bilateral bubo formation commonly follow this type of primary sore corresponding to the lymphatic drainage of the areas affected The position is almost precisely the same in female patients, contrary to popular belief An inguinal bubo forms if the primary sore is on the lesser labia or clitoris In most of the cases in female patients however the initial sore is within the vagina The lymphatic drainage of the vagina is upwards and backwards along the sides of the rectum and into the parasacral lymphatic glands The deeply seated suppuration within the tissues about the back of the vagina and sides of the rectum initiates the granulation tissue formation and subsequently stricture formation of the rectum occurs

the vulva There is discomfort about the lymphatics of the groin in all these three conditions Herpes tends to be a recurrent condition, this point alone may help to distinguish it The local skin is inflamed and acutely tender The initial small vesicles break down into very painful small ulcers Healing occurs within a few days without treatment The area remains painful for a considerable time following healing The condition is very comparable to a "cold spot" on the lips about the mouth Soft sores of venereal origin due to Ducrey's bacillus which may be identified have an incubation period of five days approximately The sores are usually multiple, they occur about any part of the vulva, typically inside the labial folds, and they are also very painful in character The groin glands are usually tender also, particularly if the sores are high up on the vulva The frequency with which soft sores are seen has decreased very much since the introduction of the sulpha drugs Soft sores heal more quickly if they are cauterised with copper sulphate or potassium bichromate crystals Silver nitrate stick may also be used judiciously and with care This form of treatment is initially painful, but this subsides quickly and the sores heal quickly The cauterisation probably helps to reduce the secondary infection in the sores

Soft sores are so termed because they are not unduly indurated about their base like syphilitic sores *This helps to distinguish them from syphilitic sores* which have a typical button-like hard induration about their bases Syphilitic sores occur following a much longer incubation period, approximately one month This period may be even longer in some instances Syphilitic sores almost invariably follow venereal infection Sores of this origin about the fingers or about the lips *are rare* *It is desirable in any form of suspected venereal sores to clean the sore* with saline and express some serum for dark-ground illumination examination with the microscope, to see if any *Spirochæta pallida* are present It should be remembered that many other larger types of spirochæte of non-syphilitic origin may be present in any form of ulceration about wet parts of the body or on open sores These must not be confused with *S pallida,* which is a spirochæte of small size

It is essential when undertaking dark-ground illumination examination to work in a dark room, it is quite useless working in daylight when undertaking this form of examination If a dark-ground illumination examination cannot be undertaken a slide may be prepared from serum expressed from the sore and sent for staining and examination at a central laboratory The results are not so satisfactory as where a dark-ground illumination test is well performed Treatment by penicillin should not be given to patients with suspected syphilitic infection prior to dark ground illumination of serum from the sore, otherwise spirochætes will not be found even in syphilitic cases Treatment of syphilitic infections has already been considered One million units of long-acting penicillin given on ten occasions is probably quite adequate The injections are given weekly

Noma pudendi is a form of ulceration which is seen occasionally in under-nourished female infants Large areas of necrotic skin occur about the vulva There may also be sores about the buttocks or cancrum oris about the cheek Traumatic ulceration about the vulva following first-degree or second-degree female circumcision seldom gives rise to serious complications

in the size of the fistula rather than healing The tissues being very unhealthy will not heal In no circumstances should a lymphogranulomatous fistula between the rectum and vagina be operated upon until the condition has been adequately treated by sulpha drugs and chloromycetin Both of these preparations in adequate doses are beneficial If ulceration is still in an active stage when treatment is started there may be very marked improvement In one case seen with a small rectovaginal fistula of this type the fistula healed completely when the patient was given a course of chloromycetin Associated with the suppuration within the areolar tissue long burrowing tracks are developed These tracks may open many inches away from the original sore The treatment of rectal stricture due to this condition has already been discussed under Rectal Diseases In most early cases of lymphogranuloma inguinale the Frei test is negative, after about two months it becomes positive in 75 per cent of the cases In 25 per cent of the patients who appear to have typical lymphogranuloma inguinale the test remains negative, whether these cases are lymphogranuloma inguinale or not is difficult to say

Considerable ambiguity exists between the two conditions termed lympho granuloma inguinale and ulcerative inguinal granuloma In both there is an *initial minute painless ulcer present which occurs about five days after venereal* contact The incubation for both conditions is the same—five days to a week with lymphogranuloma inguinale ulceration appears in the skin of the groin following infection of the groin glands, while in ulcerative inguinal granuloma the glands are thought not to be involved directly but rather the skin only until secondary infection sets in On section of the granulation tissue formed in cases of ulcerative inguinal granuloma, Donovan like bodies may be found in some of the cases On clinical grounds alone without laboratory tests to help—the Frei test for lymphogranuloma inguinale and Donovan bodies in section for ulcerative inguinal granuloma—it is almost impossible to tell the difference between these two conditions and it is tempting to consider that the two conditions are variants of the same disease

The multiplicity of names applied to the two conditions with overlapping in terminology is indicative of the confusion which exists Ulcerative inguinal granuloma is the more chronic of the two conditions The ulceration may take many months to heal It shows a tendency to spread to other parts of the body by scratching, unlike lymphogranuloma inguinale which does not show this tendency to auto-inoculation Both conditions are much improved by the use of chloromycetin, sulpha drugs also help From cases observed it would appear that the typical sign of formation of bridges of skin occurs only in lymphogranuloma inguinale This is therefore considered on clinical grounds to be the best sign of the condition of lymphogranuloma inguinale and a good method of differentiating between the two conditions, even though it may be a late sign

Another form of ulceration about the vulva is herpes It must be distinguished from the sores associated with the two conditions discussed The special characteristic which differentiates these rather easily is that herpes is very painful indeed and the patient brings it to notice because of the early acute discomfort The three kinds of sore about the vulva which are *very painful* are septic ulceration starting in hair follicles, soft sores due to infection with Ducrey's bacillus, and herpes of

breast occurring during pregnancy is well known to be of a highly malignant form There may possibly be a growth factor present associated with the developing pregnancy which affects the growth, stimulating it into marked activity

Following childbirth a condition of cervical erosion frequently occurs about the uterine cervix The condition is very comparable to ulceration in that it bleeds easily on application of pressure of any sort to the eroded surface Following the birth of the child the dilated cervix of the uterus returns to the closed condition but the lower end of the secreting mucous membrane of the cervical canal becomes somewhat everted This exposed area of cervical canal mucous membrane produces a mucous discharge which has an additional infective element present about it The condition predisposes to malignant changes and it therefore requires treatment Chemical painting of the erosion is of little or no value Thermocautery by diathermy current gives excellent results Where diathermy is not available the use of a zinc chloride saturated solution applied on a sterile applicator gives remarkably good results A preliminary dilatation of the cervix is undertaken and the plug well soaked in the zinc chloride is inserted A ligature is tied to the plug to facilitate removal after twenty-four hours The plug must be covered with a sterile swab after insertion to prevent the zinc solution burning the fornices of the vagina If the special plug supplied by Messrs Allen & Hanburys Ltd of London is not available a locally prepared sterile wooden plug can be used The calibre of the plug is a little less than that of a lead pencil, the length is 1 in A small hole through the end of the plug permits of the ligature being fixed to the plug for removal by traction The results of treatment by this method are excellent It is a very suitable method for use in country stations

Superadded infection on a cervical erosion undoubtedly predisposes to malignancy in that position There is often difficulty in differentiating between a case of early cervical carcinoma and a cervical erosion If doubt exists a biopsy specimen should be removed for microscopic section A further condition must be borne in mind in dealing with female patients in the tropics, where amœbic dysentery exists, namely, that the condition looking like a carcinoma of the cervix may really be an amœbic condition of the cervix Heilbrunn[6] describes the condition from Borneo A few cases of this condition have been seen personally

Comparing the three conditions—cervical erosion, carcinoma of the cervix and amœboma—it can be said that an erosion looks smooth, purulent, but little raised above the surrounding tissues the condition is not unduly painful There is a moderate discharge from the surface of the lesion A carcinoma looks markedly thickened and raised It has a tendency to bleed easily on pressure being exerted on it during examination As it advances there is a tendency for small particles to break off Carcinoma is not unduly painful in the early stages, until other structures become involved The hardness of its edges can easily be detected and this is very typical of malignant disease The condition is initially confined to the uterine cervix In cases of amœboma of the uterine cervix, of which only a few cases have been recognised, it is very painful indeed There is a profuse

Occasionally fungoid conditions develop about the vulva following extensive native circumcisions where tree thorns are used to suture the two sides of the vulva together Laycock[3] reports a case of this type from Somaliland A serious type of ulceration thus results occasionally in this way

A condition of warty formation of virus origin termed condyloma acuminata which may ulcerate is seen from time to time in female patients in West Africa There is widespread warty formation about the whole of the front of the vulva and inside the vagina The condition is liable to bleed freely and become ulcerated Following the onset the condition spreads rapidly until as in Fig 112 the whole vulva becomes involved This is an extremely serious condition The lesion is greatly aggravated by pregnancy Cases have been encountered where young girls, fearing to disclose an illicit pregnancy, have grossly neglected this condition of condylomata acuminata until it is sufficiently advanced to preclude a normal vaginal delivery of the child In these circumstances a Cæsarean section becomes necessary to remove the child at term No specific drug treatment has been found, to my personal knowledge, which treats this condition effectively If cases are seen early repeated diathermy applications of the infected areas may be undertaken and the condition arrested Local diathermy has been used personally in most of the cases seen Application of 1 per cent podophyllin in oil has been tried but it is most painful and is therefore not recommended if electric cautery is available. The warty areas only should be tipped with a sharpened match stick dipped in the podophyllin solution If the podophyllin reaches normal skin it causes extensive burning Oil of *Brucei javonica* has been suggested by Yu[4] which gives a similar cautery effect but is not so painful A solution of 15 per cent in tinct benz co is used



FIG 112

Extensive condyloma acuminata on vulva of pregnant woman

(Photograph by kind permission of Dr R Bannerman M R C O G)

Acosta Sison[5] in a recent report (1958), comments on the excellent results obtained in cases of condyloma acuminata following the use of triple sulpha cream the applications being made twice a day for three weeks—and cases being cured by this method The tendency for tumours to increase during pregnancy has been noted with several types of tumour It is noted with condyloma acuminata and also with cases of epulus about the gums Carcinoma of the

TRAUMA OF BLADDER, URETHRA AND VAGINA

Considering the various forms of injury about the lower genito urinary tract *in female patients, it will* be noted that these can be conveniently divided into four distinct classes

1 Injuries caused by violent accidents
2 Damage due to sex assaults
3 Misadventure during surgical procedures
4 Trauma from difficult childbirth

The type of injury due to accidental violence most commonly seen is that in which there is a perforating wound about the labia or vagina, as a result of falling on a stick while walking or working in forest country A similar accident may occur in any home Soft tissues are likely to be extensively bruised or torn as a result of wounds by sticks The wound itself rarely exceeds 1 in in length A stick penetrating soft tissues usually breaks off Most of the accidents are caused by pieces of old and rotten wood which are brittle and these break easily once the point enters the tissues *Local hæmorrhage is profuse but of short* duration Subcutaneous hæmatoma formation is often extensive as shown in Fig 113, where a stick penetrated the skin close to the base of the lesser labium The deep-seated hæmorrhage was extensive in this case A large quantity of blood clot was evacuated twenty four hours later and the condition settled down satisfactorily without gross sepsis Infection was controlled by penicillin Antitetanic serum was also given Tetanus is a serious risk in all wounds caused by wood splinters and sticks irrespective of their location, particularly if a piece of wood remains within the layers of the wound Antitetanic serum should be given in all such wounds Penicillin acts directly on tetanus bacilli, preventing their further growth and is thus beneficial These wounds seldom need to be stitched, and are better left open as they are potentially infected The edges do *not usually separate widely as they are of the short puncture type* Wounds due to falling on sticks tend to be found on the anterior and lateral walls of the vagina rather than the posterior wall as the injury almost invariably occurs when the patient falls in the sitting position on to an upturned stick Several of these injuries have been seen, many in juvenile female patients between the ages of 5 and 15 years When a perforation of the vesicovaginal septum occurs there is a leak of urine through a traumatic vesicovaginal fistula These fistulæ invariably heal very quickly and no cases have been known to develop a permanent fistula following perforating wounds The edges of a perforating wound fall together and as there is no loss of tissue and no tension about the edges all that is necessary is to drain the bladder by a fine urethral catheter for a few days A course of sulpha drugs, penicillin and antitetantic serum are desirable to decrease the risk of spreading infection A bladder infection may persist if no drug treatment is given to prevent it, in cases where an indwelling catheter is used Injury to the rectovaginal septum by sticks per vaginam is rare If an injury in this position does occur it usually follows the entry of a stick through the anal orifice and the lower rectum perforating the vagina, not in the reverse direction It is advisable

mucous discharge from the surface of the lesion The condition tends to involve the vaginal wall as well as the cervix There are usually also painful punched-out type ulcers about the lateral walls of the vagina which have a bloodstained discharge about them in addition to the growth-like disease of the cervix In view of the similarity of the two conditions, it is suggested that in these cases mucus should be examined from the surface of the involved area in all instances where either of these forms of ulceration is suspected in the tropics The mucus removed should be examined immediately after removal from the lesion to increase the chances of finding active amœbæ

In view of the very different nature of treatment required, it is essential to differentiate accurately between these two forms of pathology The point which suggests the condition particularly is the very painful nature of amœboma as opposed to carcinoma Amœboma of the cervix is usually seen in the younger group of women at an age when carcinoma is less frequently seen If no amœbæ are found in the mucus examined a biopsy specimen should be taken for section It is considered permissible, however, particularly in country stations, while waiting for the result of the biopsy tissue section, to give the patient a course of emetine to see if there is any clinical improvement in the condition during the next fourteen days Carcinoma of the uterine cervix is unfortunately very common in the tropics and ranks as the most frequently seen malignant growth in most hospitals If cervical amœboma is not recognised, it is likely to be classed as inoperable carcinoma of the cervix and the patient sent home with a sedative and a tonic All such cases require investigation in tropical climates

Squamous carcinoma of the vulva or vaginal walls should be suspected in any ulcer which does not heal within four weeks of treatment, or show marked improvement within three weeks when treated at rest in bed in hospital

On rare occasions indolent ulceration of the vulva is due to schistosomiasis Edington [7] reported such a case which, following section of an ulcer edge to exclude malignant disease, showed schistosome ova present in the tissues This possibility should be considered in districts where schistosomiasis is prevalent A form of vaginal ulceration which has been seen in some parts of the tropics is that produced by the insertion by the patient of irritant tampons into the upper third of the vagina in the belief that this may increase her fertility The practice noted in some parts of West Africa is not seen at all in other parts The inflammation and ulceration caused may be very extensive The possibility of such a diagnosis should be considered in cases of acute vulvitis and an adequate examination carried out with a view to removal of the source of irritation as well as to see the extent of the damage caused This subject will be dealt with in the next section Other forms of ulceration are seen on rare occasions Shenoy,[8] working in India, noted a case of ulceration of tuberculous origin with fistula formation between the bladder and the vagina In cases of ulceration secondary to trauma a history of injury can in almost all cases be obtained

Following violent lorry accidents female patients may suffer from fracture of the pelvis and sustain an associated injury of the urethra or bladder in the extraperitoneal or intraperitoneal position These accidents injuring the bladder and urethra are much less common in female patients than in males This is probably due to the lesser degree of fixity of the bladder in women than in men If a bladder injury is suspected the patient should be catheterised in the theatre and an estimate arrived at, judging by the presence or absence of blood in the urine If blood is present in the specimen removed fluid should then be passed in through a rubber catheter to see if the bladder distends If there is an intra peritoneal rupture of the bladder present, fluid enters the peritoneal cavity and does not distend the bladder Less fluid therefore comes out of the catheter than was put in through it, this is strongly suggestive of an intraperitoneal rupture being present The volume of fluid entering and leaving the bladder should be *measured carefully If the bladder is distended by the fluid entering it but returns* markedly bloodstained there is almost certainly an extraperitoneal rupture of the bladder Cystoscopy may also be used to detect bladder damage An intraperitoneal rupture of the bladder requires an immediate laparotomy and bladder repair followed by urethral drainage Suprapubic drainage is discouraged in female patients because of the troublesome keloid scar which may follow it in patients with a dark skin who are liable to form keloid tissue in infected wounds With extraperitoneal injury of the bladder drainage per urethral catheter should be maintained for about seven days only, this time is usually sufficient If there is no external wound a course of streptomycin is given It is here considered better than penicillin Sulpha drugs are also suitable The development of pelvic cellulitis may be judged by the appearance of the temperature chart Cellulitis in the deep tissues is unlikely to occur if an indwelling catheter is inserted to prevent a rise of intravesical pressure [illegible] female patients there is occasionally slight stress [illegible] rt causing the normal upward angulation of [illegible] e absence of demonstrable muscle fibres in the walls of the female urethra, it seems that the mechanism of holding urine in the bladder depends essentially on the angulation mechanism of the urethra, as can be demonstrated by stopping the flow of water through a rubber catheter, not by pinching it tightly, but by angulating it gently If the female urethral angulation is lost by laxity or damage to the subpubic ligaments stress incontinence is very likely to occur

Bullet wounds and malicious knife wounds of the bladder and urethra or vagina are rare Careful examination is necessary in all cases to estimate the damage present Treatment is dependent on the extent of the initial wound and complications noted

Injury of the urethra and bladder due to self-inserted foreign bodies is much less common in indigenous patients in the tropics than in patients in Europe Foreign bodies in the urethra can usually be detected by palpating with a curved probe Those in the bladder should be looked for through a cystoscope Foreign bodies which entered the bladder through the urethra can usually be removed by the same route, if apparatus is available

to give an enema to clear the rectum and colon in the hope that it will not be necessary for the bowels to act again for two or three days, thus assisting healing The wound of the rectum is almost invariably below the level of the peritoneal cavity so that this cavity is not infected The patient is given low diet for some days to decrease bowel action It is advised that in all cases of injury about the bladder, urethra or vagina the patient should be examined in the theatre under a general anæsthetic as otherwise serious injuries may be overlooked In many of these cases a piece of stick will be found in the tissues, but an adequate examination to find it is impossible if an anæsthetic is not given The piece of stick should be removed as soon as possible In this type of injury, where the



FIG 113
Hæmatoma of vulva following puncture wound by stick.

patient has been brought to hospital at a late stage suffering from developed tetanus already with muscle spasms and trismus, it is found that in a high proportion of the cases there is a piece of wood still remaining in the tissues As an X-ray examination does not show wood in the tissues the only good alternative is an examination in the theatre under anæsthesia It may often be possible to feel the wood in the soft tissues using lateral pressure, one finger being put inside the vagina and a finger of the other hand over the area where the stick is suspected It frequently is possible to palpate a piece of wood in the tissues using a silver probe passed in through the original wound After removal of the foreign body the wound should be allowed to drain and not be sutured, as adequate drainage is essential The practice of excising the wound area completely has not been practised, for although it may be of theoretical advantage it has several practical disadvantages To excise it causes unnecessary scarring

of these structures Whereas the most common cause of vaginal fistula in the tropics is obstructed labour during childbirth, due to pressure necrosis of the vesicovaginal or rectovaginal septum, the most common cause of vaginal fistulæ in Europe and North America is surgical misadventure during total hysterectomy and other timed operations

Chassar-Moir,[9] describing his series of cases noted in a series of 100 cases dealt with, states that the cause of the vaginal fistulæ was of gynæcological origin in 64 per cent of the cases Obstetrical difficulties accounted for only 36 per cent of the cases In the gynæcological group the fistulæ occurred subsequent to the following operations

Hysterectomy, various types	28	Ulceration of obscure origin	2
Colporrhaphy and Manchester operation	18	Amputation of cervix	1
Radium therapy	5	Myomectomy	1
Congenital abnormality	2	Vaginal fixation	1
Millin s sling operation	3	Cotton reel in vagina	1
Aldridge s sling operation	1	Abdomino perineal rectal resection	1

In a personal series of cases of vaginal fistulæ operated upon (Bowesman[10]), all the cases were of the post-partum type, 150 cases being reported Only one case of post-hysterectomy fistula has been noted in West Africa, *the initial operation* being undertaken by a very capable colleague The fistula was very small in size and fortunately closed itself without operation being undertaken Urethral drainage of the bladder was used *while the case was being investigated* Congenital vesicovaginal fistulæ are relatively very common in African female infants and are almost invariably associated with imperforate anus

Wounds of the upper vagina in the position of the posterior fornix may occur as a result of criminal abortion attempted by unskilled persons, in some instances the patient herself These [illegible] general peritonitis *In most cases* [illegible] has been damaged within t[illegible] has been introduced through a perforation of the upper vagina or the back of the cervical canal of the uterus *The peritonitis is caused by flooding of the peritoneal* cavity with fæcal material In one case noted several fragments of small intestine were curetted into the vagina through the perforation wound If it is suspected that criminal abortion has been undertaken *on a patient brought to hospital* with peritonitis, it is advised that material should be removed from the upper vagina and examined under the microscope to see if it contains any particles of intestinal mucous membrane *The condition is extremely serious and in most instances* fatal, the patient dying from peritonitis Patients seldom survive laparotomy for this condition as most of the cases are seen at a late stage With self-inflicted wounds of the vagina, made in an attempt *to procure an abortion, the injury is usually of* small size in the posterior fornix of the vagina and is produced by a wire or knitting needle The injury, being small and usually not damaging the intestine, produces *a local lesion which is not often fatal* The necessity for adequate examination in such cases is obvious A general anæsthetic should be given for the examination

Occasionally in elderly female patients complaining of hæmorrhagic purulent vaginal discharge *a foreign body is found in the vagina* This is almost invariably

Sex assaults giving rise to urethral and vaginal injuries are not uncommonly seen in young female patients in the tropics. Tradition and sex customs vary greatly in different parts of the world. It is usual in many African communities for the mothers of female children to insert the fifth finger into the vagina when washing and bathing the child. Female children as they get older and wash themselves are encouraged by the mother to insert one or two fingers into the vagina in order to wash the part adequately. The absence of a hymen is therefore considered of no significance in most communities nor can it be taken as evidence of sex relations for legal purposes. In the case of blood on clothes submitted in evidence of sex relations having occurred, it will be noted that if the blood is microscoped it is frequently found to be not of human origin, the red cells are sometimes found to contain nuclei suggesting that the blood is from fowls. In other instances the red cells are much larger than those of the human subject. On rare occasions in cases of early marriage, an immature female patient may sustain a tear of the posterior fornix of the vagina during intercourse, detaching it from the back of the uterus. Although this is a rare accident, it is a very serious one. It is associated with severe shock and hæmorrhage. The patient requires examination under an anæsthetic and a blood transfusion may be needed. In most cases it is not possible to repair the injury adequately by the vaginal route. It is therefore desirable in these cases to undertake a laparotomy in order to evacuate the blood clot within the peritoneal cavity and repair the injury. Drainage of the abdomen may not be necessary, but antibiotic drugs should certainly be given to decrease the risk of peritonitis.

In tropical surgical practice alleged cases of rape are constantly being sent to hospital for examination. In a high proportion of these cases rape has not occurred. In a small proportion of positive cases there may be extensive injuries about the vulva and vagina and damage to the urethra is not uncommon. These cases are often very serious indeed. It is desirable to examine the patient if possible under an anæsthetic. True rape cases not infrequently develop pelvic peritonitis. It is difficult to say how the infection has reached the peritoneal cavity, but in view of the extensive bruising which may be present it is considered that there may be a direct spread of infection from bruised tissue rather than an ascending infection through the uterine cavity and Fallopian tubes. Sedatives, baths and antibiotics are necessary to prevent this eventuality if it has not already occurred. Microscopic examination of upper vaginal contents should be undertaken to see if gonococci or spermatozoa are present, this information may be required for legal purposes. These assault cases are sometimes followed by temporary incontinence of urine, even though no obvious perforating wounds of the urethra or bladder are noted. It would seem desirable in these cases, where urinary incontinence occurs, to drain the bladder by a small urethral catheter for several days and put the patient on a course of sulpha drugs to decrease the risk of an ascending urinary infection.

Surgical misadventure during operative procedures accounts for quite a high proportion of cases of injury to the lower genito-urinary tract in female patients, this is much less so in the case of male patients. Any of the structures may be wounded—the bladder, the lower ureters, the urethra or the vagina or a combination

softening caused by the gestation In extreme cases of vaginal stricture it is not possible to pass more than a probe or a uterine sound through the stricture present The uterine cervix cannot be seen If vaginal strictures are incised they often give rise to serious bleeding which is difficult to arrest To incise the stricture in the anterior or posterior midline is liable to cause damage to the bladder or rectum and so should be avoided If the stricture is high up in the vagina the patient is sometimes content to leave it alone, but if it is in the middle third of the structure she usually agitates to have it operated upon Section of the stricture at the 2, 4, 8 and 10 o'clock positions gives reasonably good results It is desirable to apply a skin graft on an applicator following section Maintaining a skin graft in position can best be achieved by applying it to the surface of the vaginal mould with the raw surface outermost and tying it in position so that it is not displaced during insertion For this purpose oooooo catgut is used, it is of very fine calibre and is absorbable It holds the graft in position while the applicator is retained The applicator should have a central channel in it to permit of drainage from above The patient must be kept at complete rest in bed during the first week after the graft is applied In these cases if adequate antibiotic drugs are given to decrease local infection about 75 per cent of the graft takes, seldom all The 75 per cent success is, however, a great advantage in decreasing recurrence After healing further progressive dilatation is necessary In patients who are not pregnant the use of corpus luteum hormone by mouth seems to be beneficial as far as can be estimated from cases dealt with Patients found to have early stricture formation in the vagina should be warned about the danger of the practice of using irritant tampons and their remote likelihood of increasing fertility

Injury of the rectovaginal septum is sometimes caused by the nozzle of an enema syringe or other apparatus, which is injudiciously, inaccurately or roughly inserted through the anal canal With this type of accident there is marked anal sphincter spasm It is difficult to examine the patient adequately A general anæsthetic is required for this purpose In the small number of cases seen, four or five in all, it was not necessary to apply any sutures The wound is very like that affecting the rectovaginal septum where a stick penetrates it from the anterior aspect In these cases an enema may be given to clear the bowel and antitetanic serum and penicillin should be ordered None of the cases seen were fatal and in no case did a permanent rectovaginal fistula result

Injuries of the lower genito-urinary tract associated with childbirth are frequently serious It is in order to mention them here for the sake of reference and completeness, but a discussion of these conditions is given in the special section on Complications of Childbirth

A type of urogenital injury seen quite commonly in one part of West Africa consists of an incised wound of the urethra with a knife by an unqualified midwife, who in cases of obstructed labour attempts what might be called an "anterior episiotomy" Several of these cases have been seen The injury represents an interesting instinctive desire to open the brim of the pelvis as undertaken in the case of a symphysiotomy An incised wound of the urethra produced in this way is an abortive effort to relieve a pressing situation Most of the cases seen were not attended personally, they were treated by Cæsarean section for delivery of

a vaginal ring pessary which has been inserted several years earlier, and left in position and not changed It ulcerates slowly into the tissues and becomes almost buried in granulation tissue Only part of the pessary is usually seen when the patient is first examined It is a matter of judgment as to what is the best way to remove the pessary without causing further damage to the bladder or rectum In very old patients in poor condition it may, in some cases, be better to leave the pessary alone as an attempt to remove it might give rise to serious complications which the patient is unfit to stand Patients have been known to leave pessaries in position for two to five years without being changed

Whereas it can scarcely be considered surgical treatment, the matter of damage to the vagina by insertion of irritant tampons in that position by the patient herself has already been mentioned Native medicine being inserted in the form of a tampon in cases of infertility is a common practice amongst some communities The tampon is made of irritant substances usually containing ginger, pepper and tobacco These are made up into a ball of semi-solid paste Gross inflammation of the vagina occurs where the tampon is inserted, and in some instances there is generalised vulvo-vaginitis It is noted that active ulceration and subsequent fibrous tissue formation is almost invariably more marked in the right lateral fornix of the upper part of the vagina than on the left side It is thought that this is due to the insertion of the tampon by the patient's right hand which automatically tends to press the tampon into the right lateral fornix and so cause the most extensive burning in this area If the patient is seen during the acute stage of inflammation following insertion of the tampon, it is necessary to give a general anæsthetic to examine her and wash out the remains of the tampon The ulceration produced by this type of irritation takes many weeks to heal There is invariably a large amount of fibrous tissue formed which gives rise to stricture formation in the affected part The upper third of the vagina is most frequently affected The right-hand side of the uterine cervix is extensively involved and may be adherent to the right lateral wall of the vagina It is thought that in the event of pregnancy occurring and a stricture of the vagina giving rise to obstructed labour, rupture of the uterus is much more likely to occur on the left side of the cervix and spread up into the lower uterine segment The left side of the cervix is often not involved by the fibrous tissue formation and this is the only part of the cervix which can stretch normally With overstretching in an effort to permit the passage of the fœtal head, it ruptures Almost all cases of rupture of the uterus seen personally have been noted as an extension of a tear of the cervix on the left side The effect of pregnancy on the stricture is often very remarkable and there is marked softening of the fibrous tissue of the pathological band If there is only local fibrosis on one side, normal delivery is possible in a few instances and a guarded trial of labour is thus justifiable in some cases This is a matter for discussion elsewhere under Obstructed Labour The matter of treatment of vaginal strictures of this type is extremely difficult In many cases they are better left alone If the patient does become pregnant, a Cæsarean section is necessary in most cases for delivery of the child The stricture does become much less firm with the effect of the pregnancy In the less severe cases treatment may even be undertaken with advantage during the pregnancy because of the marked

how easily the upper part of the bladder *may be torn when it is being separated* from the front of the uterus close to the middle line In the middle line the bladder is very firmly fixed to the peritoneum whereas laterally it is much easier to separate

Cases of urethral injury result from forcibly attempted passage of a metal *urethral catheter* where a patient is suffering from an obstructed labour with a full bladder, the fœtal head being well down in the pelvis If a metal catheter cannot be inserted through the urethra without risk of damage to it, *it is much* safer to empty the bladder by suprapubic puncture with a fine lumbar puncture needle and a syringe attached to it These latter four types of genito urinary injury are here mentioned only in brief for the sake of bringing them to notice They will be dealt with in greater detail in the appropriate section on Obstructed *Labour*

UROGENITAL MALFORMATIONS

Developmental abnormalities of any part of the body might be thought to be common to human subjects in all parts of the world, and little influenced by conditions existing in tropical climates, there is, however, a peculiar prevalence *of certain conditions in fixed areas of the world It is difficult to explain* the high incidence of congenital dislocation of the hip occurring in the population of Northern Italy as compared to the incidence noted in other European countries In the same way, there appears to be a much higher incidence of developmental abnormalities of the urogenital system in patients in Africa than in patients in Europe Doubtless other areas of the tropics have other peculiarities *commonly* noted Whatever be the reason, most investigators would agree that there is a much greater differentiation in the hormone balance between male and female persons in most tropical countries than in their counterparts in cold climates A discussion of the reason for this is not necessary here Consideration will be given to the actual findings associated with disturbance of anatomical configuration, as found in West Africa In considering the subject of hermaphrodism, it is a *help to keep in mind the inherent bisexual* character of human beings A determination of the basic sex of a subject is dependent on the character of the germ cells found within the reproductive gonad The secondary sex characters, however, are determined by the preponderance of the male or female type of sex hormone in the body In normal female subjects there is a marked preponderance *of the female type of secondary sex hormone Subjects with* primary male reproductive germ cells have normally a great preponderance of secondary male sex hormone They both have a minor degree of the opposite sex hormone present in the body The balance of the hormones determines the degree of femininity or masculinity which is exhibited by the individual under consideration The

of the male genital

Most of these patients

the gonads but the

secondary sex characters simulate the female type, both psychologically and in the configuration of the external genital structures

the child followed by a local repair of the urethra In these cases the urethra heals quickly as there is no loss of tissue present Sutures can be inserted without tension being placed on them, using very small curved needles Bladder drainage is usually undertaken through the urethra by catheter There is some risk of the urethra not healing if a catheter is inserted into it Considering these cases in the light of experience in dealing with many cases of urethrovaginal fistulæ following childbirth, it would appear that inserting a urethral catheter for drainage of the bladder might with advantage be replaced by drainage by posterior vaginal cystotomy A small rubber catheter can be inserted into the bladder in the midvaginal position using a trocar and cannula of the curved type inserted through the urethra and pushed from "within outwards" into the vagina, the rubber catheter being put into the bladder through the cannula The cannula is then withdrawn back through the urethra, an ordinary small catheter is used and sutured in position It is retained for one week After this time a urethral catheter can be used more safely and the vaginal cystotomy closes within a few days There is very little risk of the catheter opening forming a permanent fistula Fine polythene catheters are more suitable for insertion through the urethra than rubber catheters, being less irritant No suture is necessary in the cystotomy wound following [illegible] of the catheter, the edges come together quite easily there being no lo [illegible] days Urethral [illegible] of any type of urethrovaginal fistulæ This cause of urinary obstruction should be remembered Following plastic repairs in this position, urethral sounds should be passed about once in every six months Great care is necessary to avoid injury to the urethra

Varying degrees of trauma follow native circumcision in many parts of Africa and South America In some instances the urethra is injured with meatal stricture formation Anterior commisural scarring may give rise to serious hæmorrhage from the external pudendal artery due to laceration during childbirth as scar tissue does not stretch well

Varying degrees of laceration of the perineum are common injuries of childbirth Lateral episiotomy is on occasions undertaken as a calculated procedure in childbirth, it is none the less a form of wounding of the vagina

Trauma of the vagina may be caused in female patients of small stature by use of *excessively large sized obstetrical forceps In most of the hospitals in the* tropics, in country stations especially, only one size of obstetrical forceps is available, the largest manufactured It would appear unreasonable to use the same size obstetrical forceps for a woman of 5 ft 10 in and a woman of 4 ft 10 in A small-size obstetrical forceps is required in the theatre of all stations One case was encountered where the posterior attachment of the vagina to the back of the uterus was torn away completely as a result of pressure exerted by the blade of an obstetrical forceps badly applied The case had to have a Cæsarean hysterectomy performed Damage to the urethra may follow the operation of symphysiotomy if adequate care is not exercised to protect the urethra during performance of this operation Having undertaken many Cæsarean sections by the extraperitoneal route in cases of obstructed labour which were grossly infected, it is appreciated

be rectified It is necessary only to insert a well-oiled silver probe into the minute orifice at the base of the glans clitoris, through which urine is passed With this inserted down to the level of the base of what should be the normal entrance to the vagina, the probe is then pulled downwards and forwards, keeping it strictly in the middle line, so that the adherent lesser labia are separated Care must be exercised that the point of the probe does not enter the urethra and damage it, its point must be kept close beneath the skin while being inserted This operation is a very minor procedure and little or no bleeding occurs It is necessary only to apply sterile vaseline locally afterwards to prevent the two sides adhering again during the next few days No anæsthetic is necessary The treatment can be carried out at the first visit in the consulting room, with the infant held on the



FIG 114



FIG 115

Fig 114—Hypospadiac infant with cleft scrotum simulating female lesser labia
Fig 115—Vulva of female infant showing adhesion of lesser labia before treatment

mother's knee In almost all cases the mother expresses surprise that the operation is of such a minor nature, considering the long journey she has travelled for treatment No dressing is required It can be seen from the photograph taken after treatment that when the lesser labia are separated a normal hymen is present about 1 cm inside the vagina The condition represents a minor failure of feminisation, giving rise to an appearance approximating to some degree towards the male configuration of the external urogenital organs

Imperforate hymen is a condition much less commonly seen than adhesion of the lesser labia In many instances patients are first seen at hospital with this condition because of a lower abdominal swelling simulating early pregnancy and having failed to menstruate at the age of 15 or 16 years There is obvious breast development, indicative of active female hormonal function The lower abdominal swelling is caused by an accumulation of menstrual blood in the vagina and uterus of one or two years' duration The uterus is usually splayed out into a dome-like structure with widely dilated cervix, because of the pressure of the locally accumulated blood The hymen is easily opened under an anæsthetic by a cruciate

Disturbance of hormonal balance may be due to congenital defects in development while less commonly it occurs as a result of degenerative disease giving rise to a recession of previously dominant secondary sex characters Ultimately the secondary sex hormone level does not correspond to that previously found in the body of the patient In cases of leprosy in male patients there is not infrequently a marked upset in the hormone balance, whether due to a decrease in male hormone, or possibly to a degenerative liver change, is not certain It is not at all uncommon to note the presence of gynæcomasty in male leper patients as shown in the illustration in Fig 92 It is well known that the giving of male hormones by mouth is beneficial to young male children with undescended testicles and following its administration the testicles may descend more quickly The effect of suprarenal tumours in female subjects likewise has a virilising effect on women This causes an atrophy of breast tissue, and involution of the female reproductive organs An alteration in the voice takes place approximating to that of the adult male and hirsuties or excess hair on the body occurs The excess hair developed has a male type of distribution, with beard development and pubic hair of the male variety

In all male subjects there are vestigial remnants of the female reproductive organs present, these may be noted as the uterus masculinus in the prostate, and the hydatid of Morgagni attached to the body of the testicle which probably represents the fimbriated end of the Fallopian tube of the female subject In female subjects the vas deferens of the male is represented by the vestigial duct of Gartner, which runs like a fine thread from a position close to the ovary of each side, between the layers of the broad ligament, beneath the Fallopian tube and down the side of the uterus and vagina The duct terminates in the lateral wall of the vagina about its middle third From this vestigial duct paraovarian cysts develop within the lower abdomen The abnormality of cyst formation in the lateral wall of the vagina, causing marked distortion of the vagina, is also explained by the accumulation of fluid in the terminal part of the duct as it abuts on the lateral vaginal wall Paraovarian cysts of similar origin are comparatively common in African subjects

Considering the entrance to the vagina, two distinct abnormalities are noted occlusion of the vagina by adhesion of the lesser labia, and imperforate hymen Adhesion of the lesser labia represents a failure of opening, in the middle line, of the two skin folds These skin folds corresponding to the two sides of the urethra and scrotum in the male are represented in the female by the lesser labia This homology can be seen in Fig 114 where in a young male subject, with marked hypospadias, there is a cleft scrotum Adhesion of the lesser labia is an extremely common condition in female African infants Mothers not uncommonly bring these children hundreds of miles to central surgical clinics because of occlusion of the vagina by adherent lesser labia These cases are usually referred by the doctor in their district for plastic surgery It is quite obvious that the nature of the condition is not fully appreciated and the method of treatment necessary for its relief not well known, for this reason the subject is mentioned here Three photographs are included (Figs 115, 116, 117) to illustrate the condition before, during and after treatment, and the ease with which the abnormality can

post-partum type If on investigation the ectopic ureter is found to be dilated and surmounted by a kidney of low functional value, a nephrectomy is the most satisfactory method of dealing with the abnormality

On rare occasions the urethra may enter the anterior wall of the vagina without passing under the bridge of the pubis This condition has been seen on one occasion only It is usually discovered unexpectedly during gynæcological examination, noting the apparent absence of a normal urethra No treatment is required In the case seen, the patient was able to hold urine without any leakage in spite of the anatomical abnormality In one instance an infant with an ectopia vesicæ had the ureters coming to the surface of the body at the perineal position Fig 118 shows a photograph of this case, a drop of urine is visible on each side at the position where the ureters emerge In cases of ectopia vesicæ in female children the vagina is grossly abnormal The orifice is smaller than normal and the clitoris is usually divided On X-ray examination of the pelvis a marked gap is noted between the two sides of the pubis The bones are approximated only by ligamentous tissue The bony abnormality seems to cause no difficulty in locomotion Ectopia vesicæ has been seen much more commonly in female children than in males Fig 119 shows a case of this condition in a small girl aged 6 years with an ectopia vesicæ and an abnormality of the vagina In this condition there is a failure of development of the anterior aspect of the urinary bladder which gives rise to a gap in the soft tissue of the lower abdominal wall from the pubic position to the level of the umbilicus The navel is noted to be represented by a dome-shaped scar on the top of the bladder abnormality and not as a complete circle on the abdominal wall Fig 120 shows a case of ectopia vesicæ at birth with the umbilical cord remnant still attached The ureters can usually be seen to pout on the bladder mass as conspicuous projections, as seen in the illustration Urine comes from them at regular intervals In the absence of any urethra or sphincter mechanism being present below the bladder, plastic repair of the condition is an impracticable proposition, as local urinary continence cannot be established It is recommended in these cases that the ureters should be transplanted into the sigmoid colon using the Nesbitt technique Details of this operation are described in the section on Complications of Childbirth It is essential to test the rectal sphincteric mechanism to see if the patient can hold water in the rectum before the ureters are transplanted into the colon The object of the operation is to give the patient some form of sphincter control and so prevent perpetual leakage of urine which is offensive A point which may be mentioned here is that with the umbilicus in the abnormally low position it is necessary to open the abdomen above the umbilicus if a transperitoneal approach to the ureters is decided upon When the abdomen is opened the obvious minor difficulty arises that one is immediately confronted with the ligamentum teres of the liver between the umbilicus and the porta hepatis and the peritoneal fold attached to it These must be cut through and tied off before proceeding with the operation This finding may be a little disconcerting on dealing with the first case of this condition

The condition of rectovaginal fistula in female infants has already been discussed when dealing with the subject of imperforate anus and infantile bowel obstructions

incision in the appropriate position A large quantity of dark brown chocolate like liquid blood is evacuated, with recession of the lower abdominal swelling, and the occurrence of normal menstruation within four weeks

Abnormalities in the development of the bladder and ureters are not very uncommonly seen The presence of more than one ureter on one or either sides is of no serious import, nor danger if the ureters enter into the bladder The possibility of a double ureter must be remembered when transplantation of the ureters is being undertaken for cases of irreparable vesicovaginal fistula On one occasion two cases of this sort were encountered on the same day when undertaking transplantation of ureters for two different patients It would be most disappointing to find urine still coming from the damaged bladder after



FIG 116



FIG 117

Fig 116—Method of separation of adherent lesser lab a with probe
Fig 117—Appearance of vulva after treatment Note unaffected normal hymen

transplantation of a ureter on each side, when in fact three ureters existed, the third not being recognised On rare occasions one ureter may enter direct into the vagina, either close to the position of Bartholin s gland on one side or about halfway up the vaginal wall on the lateral aspect An ectopic ureter can be recognised clinically even before the point of entry is detected by the characteristic symptomatology The symptoms are present from birth After the time when the child may be expected to have developed control of bladder function it is noted that in addition to passing a normal quantity of urine per urethram at intervals there is a persistent leakage of urine The bladder is filled by the ureter which enters into it and functions normally while the ectopic ureter going into the vagina direct with no sphincteric arrangement at its lower ends spurts urine into the vagina every ten to twenty seconds giving rise to persistent leakage These cases can be treated after investigation by reimplantation of the ectopic ureter into the bladder The operation is performed more easily by the transperitoneal route than the extraperitoneal approach but either may be adopted The procedure undertaken is very similar to that undertaken for ureterovaginal fistula of the

peritoneal cavity and the fertilised cells then proceeding through the left tube and left uterus Considering however that there was no indication of a hæmatocolpos on the left side in spite of the imperforate hymen on that side, it is likely that there was a small unrecognised communication between the right and left vagina, permitting of escape of menstrual blood from the left uterus Fertilisation probably took place via this route rather than through the right Fallopian tube This is a most instructive case and it indicates the extreme difficulties that may be encountered by junior medical officers on arriving at a country station in the tropics with limited facilities and no second opinion available to clarify the position

Patients are seen from time to time with a ring-like loop of tissue hanging from the anterior part of the uterine cervix The band of tissue represents the



Fig 120
Ectopia vesicæ at birth showing relative position of umbilical cord

anterior lip of the cervix which has been damaged by a pressure necrosis during a partially obstructed labour During convalescence a slough separates from the anterior lip of the cervix leaving this band of tissue attached at each side The patient may seek advice because of the abnormality detected Treatment is not really necessary, but if the patient feels uncomfortable the band of tissue can be removed

Returning to the complicated subject of hermaphrodism, the problem is one which has many aspects The psychological aspect is of a major nature, while the surgical requirements to improve the external configuration of the patient may be minor or major It can be said quite safely that a high proportion of pseudo-hermaphrodites are basically of the male type as judged by the germ cells in the gonads, but that the secondary characteristic and genital configuration closely approximate to that of the female type Fig 122 shows a section of a hermaphrodite "gonad" as it is best called It shows primitive testicular structure but with interstitial tissue more of the female type like that found in the ovary This specimen was removed from an "apparently female" patient, who was one of

An abnormality occasionally encountered is duplication of the vagina and this condition can give rise to very perplexing situations Fig 121 shows a case of this type from personal records There are two entrances to the vagina each opening into a separate channel, representing a bipartite vagina Each side communicated at its upper end with what might be termed a hemi uterus or cornuate structure somewhat comparable to that seen in rabbits An interesting case representing the difficulties which may arise as a result of bipartite vagina is described by Knight [11] An African patient attended an obstetrical department with a most peculiar history The present pregnancy was at full term and the fœtus was alive The woman appeared to have an imperforate hymen She gave



Fig 118



Fig 119

Fig 118—Ectopia vesicæ with ureters opening in perineal position
Fig 119—Ectopia vesicæ in female child aged 6 years Note ureteric openings

a history that she had been delivered of a normal full term child two years earlier and this was born by the normal vaginal route It was very difficult to understand either how she produced a normal infant two years ago and how she was now pregnant with an apparently imperforate hymen The present pregnancy was at full term and the woman was already in labour on arrival The hymen was opened and the woman delivered per vaginam with limited damage to external structures After convalescence it was found that there was a double vagina present The present baby was born through the vagina on the left side, so presumably her first child was born through the vagina on the right side The vagina on the right side had been drawn out of sight by the distortion of the tissues with advance of the present fœtal head, and was therefore not visible In view of the imperforate hymen on the left side at the time when she was first seen it must be concluded that she became pregnant by insemination through the vagina on the right side Fertilisation may have occurred by male cells entering the

peritoneal cavity and the fertilised cells then proceeding through *the left tube* and left uterus Considering however that there was no indication of a hæmatocolpos on the left side in spite of the imperforate hymen on that side, it is likely that there was a small unrecognised communication between the right and left vagina, permitting of escape of menstrual blood from the left uterus Fertilisation probably *took place via this route rather than* through the right Fallopian tube This is a most instructive case and it indicates the extreme difficulties that may be encountered by junior medical officers on arriving at a country station in the tropics with limited facilities and no second opinion available to clarify the position

Patients are seen from time to time with a ring-like loop of tissue hanging from the anterior part of the uterine cervix The band of tissue represents the



FIG 120
Ectopia vesicæ at birth showing relative position of umbilical cord

anterior lip of the cervix which has been damaged by a pressure necrosis during a partially obstructed labour *During convalescence a slough separates from* the anterior lip of the cervix leaving this band of tissue attached at each side The patient may seek advice because of the abnormality detected Treatment is not really necessary, but if the patient feels uncomfortable the band of tissue can be removed

Returning to the complicated subject of hermaphrodism, the problem *is* one which has many aspects The psychological aspect is of a major nature, while the surgical requirements to improve the external configuration of the patient may be minor or major It can be said quite safely that a high proportion of pseudo-hermaphrodites are basically of the male type as judged by the germ cells in the gonads, but that the secondary characteristic and genital configuration closely approximate to that of the female type Fig 122 shows a section of a hermaphrodite "gonad" as *it* is best called It shows primitive testicular structure but with interstitial tissue more of the female type like that found in the ovary This specimen was removed from an "apparently female" patient, who was one of

" sisters ... mality The external ... There was good al organs looked in a ... The outlook and psych ... usually dominantly st development also present The condition affects the patients little in early childhood as he female type The condition affects the patients little in early childhood as y do not appreciate their abnormality Older children become aware that y are "not quite normal" and after the age of 14 years the absence of expected nstruation brings the nature of the condition acutely to their notice They ept the absence of menstruation with reluctance, its onset being associated th a certain amount of ritual in many parts of the tropics Many of these tients, considering themselves to be female, marry, believing that menstruation ill probably start after marriage The absence of a pregnancy distresses them



Fig 121
Appearance of vulva in case of duplication of the vagina

greatly Although there is no uterus present the vagina may be reasonably well developed even if below normal proportions The nature of the condition is frequently brought to notice by the onset of an inguinal hernia This is liable to ... adolescence A spherical mass is usually noted coming down into ... a reproductive organ On opening the ... tting a finger ... quite obvious ... it If one or ... A state of by this examination that ... removed the effect is somewhat ... full development It is considered ... certainly ... ductive ... The be removed, and the hernia ... organ may descend into the lateral prepubic position ... descent of the testicle represents a degree of androgenisation associated with adolescence To remove one testicle at this stage is considered to be an advantage

clitoris and lesser labia One reproductive organ or testicle was removed from *the inguinal canal where it could* easily be palpated It is likely that with the operations undertaken a greater degree of feminisation was likely to take place The retention of one reproductive gonad was considered desirable in the belief that removal of both gonads at this early age of 2 years might seriously retard the child's development Whether the second gonad should be removed at a later stage in early adult life is a matter of judgment The second patient brought up as a female developed, at the age of 15 years, obvious masculine characters, the testicles descended into the lesser labia and the clitoris increased in size The childish feminine voice of a "girl" broke and was replaced by the deeper and harsher type of voice characteristic of a male in late adolescence. There was no evidence of breast development and there was a decrease of subcutaneous fat giving rise to the masculine type of appearance with lack of rotundity *about the hips* There was a short vagina present and the clitoris was very large There was a *marked increase in the development of the sweat glands and the head hair* became relatively short The patient was becoming obviously more like a male *than a female The school colleagues called* "her" *the* "boy" *and were a little* indignant that "he" won almost all the prizes at the school sports for running and jumping *Photographs were* not taken of this patient, in a special effort not to lay undue emphasis on the abnormality during the first visit No treatment was decided upon at the first visit and the patient did not return to hospital If hermaphrodism is suspected there are several valuable points to look for with a view to making a correct assessment of the patient's condition Philipp,[15] considering congenital malformations of the reproductive organs, indicates that the true sex according to the gonad determination can be detected by examination of white blood cells The nuclei of leucocytes from females stain more darkly than do the nuclei of leucocytes from males If an adult pseudohermaphrodite is a male, it may be detected by the presence of male gonadotrophin in the urine, this is unlikely to be positive in early childhood Radiological changes in the skeletal structure may also suggest the true sex Examination of the peritoneal cavity through a culdoscope has been suggested It is, however, not difficult to arrive at an equally accurate diagnosis by a rectal examination to detect the presence or absence of a uterus True female hermaphrodism is more rare than male pseudohermaphrodism and it is usually associated with the presence of a suprarenal abnormality The use of cortisone decreases the hirsuties seen in this latter condition If an expert pathologist is available to express an opinion it is usually possible to determine the sex of a patient in doubtful cases of hermaphrodism by examination of an oral smear born
infants The presence of the
nuclei stain more darkly than
of the male type of cells Cellular hyperchromatism suggests female sex it would be *advisable to use smears from* normal infants of known sex for comparison in this method of examination Hoffenberg and Jackson[16] refer to the detection of pseudohermaphrodism *by the method of male* skin chromosomal pattern In any case where plastic surgery is suggested for the improvement of anatomical abnormalities associated with the external genitalia, it should be remembered

three "sisters" all suffering from the same congenital abnormality The external genital organs looked in all cases typical of the female type There was good breast development also present The outlook and psychology is usually dominantly of the female type The condition affects the patients little in early childhood as they do not appreciate their abnormality Older children become aware that they are "not quite normal" and after the age of 14 years the absence of expected menstruation brings the nature of the condition acutely to their notice They accept the absence of menstruation with reluctance, its onset being associated with a certain amount of ritual in many parts of the tropics Many of these patients, considering themselves to be female, marry, believing that menstruation will probably start after marriage The absence of a pregnancy distresses them

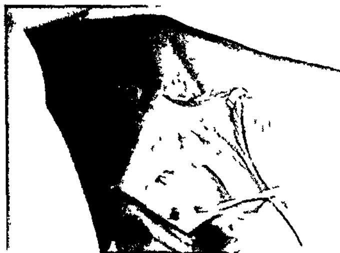


FIG 121
Appearance of vulva in case of duplication of the vagina

greatly Although there is no uterus present the vagina may be reasonably well developed even if below normal proportions The nature of the condition is frequently brought to notice by the onset of an inguinal hernia This is liable to occur during adolescence A spherical mass is usually noted coming down into the inguinal canal and this is obviously a reproductive organ On opening the peritoneum through the hernial sac at operation it will be found on putting a finger into the pelvis from above that there is no uterus present It becomes quite obvious by this examination that one is dealing with a hermaphrodite patient If one or both testicles are removed the effect is somewhat unpredictable A state of complete eunuchism before maturity will arrest full development It is considered that the reproductive organ attached to the back of the hernial sac should certainly be removed, and the hernia repaired in the normal way In some cases a reproductive organ may descend into the lateral prepubic position on one or both sides The descent of the testicle represents a degree of androgenisation associated with adolescence To remove one testicle at this stage is considered to be an advantage

12

Ritual Operations in the Tropics

CIRCUMCISION IN THE MALE

THE operation of circumcision or removal of the prepuce is an extremely ancient procedure. Its origin is uncertain. Egyptian stone carvings suggest that it was in existence centuries before the time of Abraham, who at the age of 90 years instituted it as a ritual ceremony amongst his own people. He visited Egypt fifteen years earlier where he no doubt saw the practice and realised its value in binding together the members of a social group. The performance of circumcision was built up into a ritual which afforded an excellent opportunity of extracting from the individual adult members of the community an assurance of allegiance to the basic principles necessary for the formation of a stable and prosperous state. *In this way a "token of a Covenant" was implied, or an* agreement that if loyalty was promised security was assured (Genesis 17).

The basic idea of ritual circumcision has altered little from its original motive. Ritual circumcision is carried out in most cases on individuals of sufficiently mature age to appreciate the significance of personal responsibility in the conduct of private and public affairs. Amongst the Jewish community the original circumcisions were performed on adults, but subsequently on infants on the eighth day after birth, but with a solemn responsibility accepted by the parents to inculcate the principles of national and spiritual loyalty to the child circumcised, as it developed to mature age. The decision to perform circumcision not earlier than the eighth *day after birth was probably the result of experience that an infant circumcised* during the first week is much more likely to bleed unduly after the operation is performed than when it is over 1 week old. An infant's prothrombin level is below the normal level required for normal blood clotting during the first seven days of life. Infantile tendency to hæmorrhage in other parts of the body is well known in the exhibition of cephalhæmatoma and bleeding from the umbilical stump. By Jewish law, if a woman lost two male children from hæmorrhage following circumcision, she was permitted to forgo circumcision of her third male child. This would suggest that the risk of hæmophilia was appreciated at a very early date.

The number of ritual circumcisions undertaken annually in the world greatly exceeds the number of those undertaken under skilled supervision for medical reasons. Ritual practice has undoubtedly maintained the integration of tribal communities. The same can be said for tribal markings. The prevalence of circumcision varies greatly. In communities where there is no ritual ceremony attached to circumcision, the incidence of this procedure is relatively low, varying from nil to 30 per cent. MacCarthy [1] found in undertaking an investigation on

that plastic operations in an adult patient with heavy pigmentation are not devoid of risk in view of the fact that keloid formation may occur In infants under the age of 2 years the risk of keloid formation is, however, very small True hermaphrodism, where an individual contains both male and female primary reproductive cells, is exceptionally rare

EXTRACT

Rapid method of urine and stool testing in the tropics

Using Ames diagnostic reagents, seven different clinical tests can be undertaken in three minutes

1	Albustix strips for protein in urine	Qualitative
2	Clinistix strips for glucose in urine	Qualitative
3	Clinitest tablets for glucose in urine	Quantitative
4	Acetest tablets for acetone in urine	Qualitative
5	Ictotest tablets for bilirubin in urine	Qualitative
6	Occultest tablets for blood in urine	Qualitative
7	Hematest tablets for blood in stools	Qualitative

This is an excellent set of reagents for clinical work The time saving factor is invaluable where staff is very limited The fact that a spirit lamp is not required for any of the tests commends them

The unique advantages of these diagnostic reagents are

Rapidity Most important in busy clinics
No heating Very valuable asset in tropics where spirit lamps dry up so quickly
Simplicity All tests are easy to perform and require minimal equipment
Reliability Results very dependable due to high quality of chemicals used
Standard technique Prevents errors due to individual variation

The outfit is supplied complete with test strips, tablets, miniature test tubes, a stand and standardised droppers by Ames Company (London) Ltd , Nuffield House, Piccadilly, London, W 1 (Agents in most of the capitals of Europe, Africa and Asia)

REFERENCES

1 GELFAND, M & ROSS W F (1953) Distribution of schistosome ova in the genito-urinary tract in subjects of Bilharziasis *Trans roy Soc trop Med Hyg* 47, 218

2 RODA, A P (1957) Incidence of the species *Candida* from different sources and their sensitivity to mycostatin *J Philipp med Ass* 33, 251

3 LAYCOCK, H T (1950) Surgical aspects of female circumcision in Somaliland *E Afr med J* 27, 445

4 YU, K-Y (1950) Treatment of papilloma and verruca with oil of *Brucea javonica* *Chin med J* 68, 99

5 ACOSTA SISON, H (1958) Treatment of condyloma acuminatum *J Philipp med Ass* 34, 301

6 HEILBRUNN, A (1950) Amœbiasis vaginæ *Docum neerl indones Morb trop* 2, 118

7 EDINGTON, G M (1957) Schistosomiasis in Ghana with special reference to pathology *W Afr med J* 6, 45

8 SHENOY, A V (1952) Case report of vesico vaginal fistula of tuberculous origin *J Obstet Gynaec India*, 2, 240

9 MOIR J CHASSAR- (1954) Vesico vaginal fistulæ *Lancet*, 1, 57

10 BOWESMAN, C (1955) Post partum vaginal fistulæ *Irish J med Sci* p 147

11 KNIGHT H [illegible] *r J Med* 3 303

J Obstet Gynaec India, 3 20

Chin med J 71, 148

Bull Johns Hopk Hosp 96, 265

productive organs *German Medical Monthly*, 2 50

16 HOFFENBERG, R & JACKSON, W P (1956) The problem of intersex *S Afr med J* 30 (1), 417

circumcision to some extent defeats the object of the ritual In ritual circumcision ceremonies the operation is undertaken by an experienced person using a sharp knife while the prepuce is pulled forward The position of the incision is sometimes marked using ink or red clay The operator undertaking the circumcision is usually a senior member of the community held in high personal esteem With some embarrassment in 1936 while on trek this privilege was bestowed upon myself by a village community whose language was well known to me Forty-eight boys were circumcised in one hour and forty minutes, the procedure taking slightly less than three minutes for each patient They were undertaken by the "rapid" method, to be described later In spite of no anæsthetic being used there was no struggling, resistance or crying There were no complications and only three of the boys required a second dressing one week later One ventral and one dorsal suture of fine catgut was used in each case—these people did not disdain sutures

Considering the complications which may arise during ritual circumcision undertaken by non-skilled technicians, it is noted that there is some degree of sepsis from the wound in almost all cases which are not properly cleaned before the operation is performed Pande[4] notes that amongst the Bagashie tribe in East Africa in one season 3,500 boys were circumcised at ritual ceremonies There were four deaths—0 1 per cent mortality No retaining sutures were used The causes of the four fatalities were tetanus, shock, hæmorrhage, hæmorrhage and shock The position of the incision was marked by red clay The knife used was not sterilised The boys were circumcised in the standing position, which would predispose to greater shock than if patients were lying in the horizontal position

Patients are constantly being admitted to hospital in the tropics because of bleeding following circumcision In some instances there is gross trauma to the soft parts, due to an inaccurate incision In some instances the glans penis is cut followed by a profuse hæmorrhage In a few instances a traumatic urinary fistula has been seen due to removal of tissue from the floor of the urethra close to the external urinary meatus Fatalities are not common though patients may be admitted in poor condition The hæmorrhage has usually stopped by the time they arrive at hospital Persistent slow bleeding following circumcision is not easily stopped by the addition of more bandages In all such cases it is desirable to remove the dressings and clear away blood clots and *apply an adrenaline swab* to the bleeding area which can be held in position for ten minutes or so This saves *the patient the discomfort of applying an artery forceps* which is painful without an anæsthetic An anæsthetic given to a patient in a shocked condition may not be entirely safe If an adrenaline-soaked swab does not stop the bleeding completely an artery forceps of the mosquito type should be applied to the precise bleeding spot, gripping the minimum of tissue to minimise the discomfort caused The vessel which was bleeding is then tied with fine catgut, a blood transfusion is necessary in some cases

The risk of hæmorrhage is increased *if circumcision is undertaken in patients* suffering from marked anæmia To inspect the patient's conjunctiva before operation is easy and *a fair means of excluding cases of severe anæmia* Pallor

the incidence of circumcision in a national sample of 4-year-old children in England that the average circumcision rate was 9 7 per cent soon after birth and 24 1 per cent at the age of 4 years In the smaller professional classes the incidence was 38 9 per cent at the age of 4 years, while in the much larger labour classes the incidence at this age was 21 9 per cent Allowing for a small number of circumcisions in children over this age and in adults, the adult figures are probably about 45 and 25 per cent respectively

Where the procedure is associated with ritual, the incidence is usually from 60 to 100 per cent In non-Mohammedan Asiatics circumcision is not commonly practised Circumcision in Europe and North America in non-Jewish communities is undertaken exclusively on æsthetic or medical grounds Ritual circumcision is undertaken in most Mohammedan communities in Africa It is maintained as a tribal institution amongst many non-Mohammedan tribes, while it is rigidly declined by other tribes Ritual circumcision of males is usual in most of the Bantu tribes of South Africa (Laubscher [2]) In African peoples where circumcision is practised, boys look forward to this ritual ceremony as a privilege, conferring on them honour and special rights (La Fontaine [3]) Amongst the Bagashie people of East Africa the ceremony is equivalent to "coming of age," and confers the right on the participant to speak at public parties, take part in public affairs, give evidence in native courts and get married Those not circumcised are not accorded these privileges

In West Africa ritual circumcision ceremonies are conducted mostly in the Harmaatan season At this time of the year, about December and January, the day and particularly the night temperatures are comparatively below those of other times of the year The humidity is also relatively low, being about 30 to 40 per cent as compared with 80 to 100 per cent at other times These two factors decrease the risk of hæmorrhage following circumcision The blood supply of the part is decreased by the lower temperature, and the low humidity improves clotting The seasonal incidence of circumcision ceremonies is therefore founded on very sound surgical principles The boys collected for circumcision have some tuition from an older member of the community regarding their responsibility as initiates into the ranks of manhood A good opportunity is thus afforded by this ceremony of inculcating the basic principles necessary for the stability of the community To mark the occasion appropriately and lay emphasis on its importance those to be circumcised are given new clothes in most instances They are also allowed to carry a stick as part of the ritual and in recognition of assumption of authority, stress, however, is laid upon the importance of not abusing this privilege During the ceremony emphasis is laid upon the necessity of a degree of Stoicism in manhood To exhibit fear or physical violence during circumcision is looked on as a disgrace No anæsthetic is used for the operation Amongst some tribes of East Africa the practice of having long and exhausting dancing before the ceremony is thought to predispose to a state of exhaustion with a reduction in the patient's sensitivity to pain

Skin stitches are usually not used during ritual circumcision Patients may even decline circumcision in hospital as in some instances tribal privileges are not accorded to those circumcised in hospital as sutures are used Hospital

within the sac of the prepuce when there is a degree of phimosis present Posthitis of this type in early adolescence predisposes to masturbation which is undesirable

Cases of hypospadias with a redundant hooded glans, looking very abnormal, are sometimes brought to hospital by parents for circumcision Removal of this loose flap of tissue makes the child look more normal but the possibility should be remembered that the redundant flap of skin may be useful at a later date in the performance of a plastic repair of the urethral defect Removal of this tissue should therefore not be undertaken for cosmetic reasons alone without due consideration of its possible usefulness in repair procedures Where congenital



Fig 125
Paraphimosis in a boy aged 12 years

phimosis is present it can be treated by dilatation of the prepuce, retracting it completely, adhesions should be removed and liquid paraffin applied so that further adhesions are not developed The prepuce should be retracted daily during washing to prevent the phimosis recurring Where phimosis is marked circumcision is much more satisfactory as a form of treatment permanently curing the condition

Paraphimosis (Fig 125) is a condition seen most frequently between the ages of 5 and 15 years With the anterior preputial orifice forcibly retracted over the glans to the position of the coronal sulcus a gross œdema develops and the skin cannot easily be brought back to the original position There is marked swelling of the skin distal to the constricting ring and proximal to the coronal sulcus as acute œdema develops The application of cold compresses sometimes applied in the treatment of this condition is quite useless In a high proportion of these cases reduction of the paraphimosis can be achieved by firm even pressure

of the conjunctiva is usually quite apparent if the patient has a hæmoglobin level below 50 per cent It is not always obvious at levels above this Hæmorrhage is decreased and clotting encouraged by free exposure of the wound to the air It is advisable to apply one ligature to each of the superficial dorsal veins, one on each side Excessive swabbing should be discouraged and after sutures are applied the minimum of dressing is used in adolescents and adults In infants no dressing at all is necessary A napkin is used and changed when soiled by urine

The risk of hæmophilia in African patients is lower than in European patients A condition very like hæmophilia is seen in infants of under 1 week old where there is a temporary inadequate clotting ability due to low prothrombin Bleeding is more troublesome in patients coming from districts where scurvy is prevalent The tendency to hæmorrhage in cases of low vitamin C content is well known Hæmorrhage due to injury of the glans penis is predisposed to by inadequate preliminary retraction and cleaning off of the adhesions between the under surface of the skin of the prepuce and the glans penis

The legal position of unregistered practitioners is of importance from the medico legal point of view considering the occurrence of fatalities following circumcision Vaisey[5] reports the case of this eventuality taking place in Uganda (Criminal Session Case 136 of 1953) The judge s ruling was that " practice of African systems of therapeutics by a suitably qualified person is permitted and ritual circumcision should come within this category, but this does not exempt the operator from taking reasonable care and precautions during and after the operation " Although " death by misadventure " occurred the defendant was not convicted The operation was undertaken as a recognised tribal institution by a " suitably qualified person " and there was no evidence of criminal neglect or negligence

In Jewish communities circumcision in infants is usually undertaken by a qualified medical practitioner of the Jewish community taking part in the ceremony or a Rabbi who has training in aseptic technique In spite of the presence of some sepsis in the wound and a wide scar occurring following healing by granulation tissue in unsutured circumcisions at ritual ceremonies of adolescents, keloid scar does not occur This is due to the fact that there is no fat in the tissues of the penis and the degeneration products of fat appear to be a prerequisite in the formation of keloid tissue

It is convenient to discuss non-ritual circumcision in this place for ease of comparison of methods employed The various methods of technique have been arrived at by means of trial and error and a description of these may be found helpful to those with limited experience and better results achieved by all who are called upon to undertake this operation In communities where circumcision is not undertaken as a ritual procedure there is usually a strong personal bias in favour of or against circumcision, there are unaccountable prejudices in both directions Many parents like their male children circumcised for æsthetic reasons and this is particularly the case with many young African mothers Infantile circumcision forestalls recurrent attacks of posthitis or inflammation of the prepuce The inflammation is due to decomposing ammoniacal urine retained

It should not be omitted to mention one *contraindication* to circumcision. Patients are seen from time to time requesting circumcision because of thickening of the prepuce. This condition is usually due to filariasis in the tropics and indicates the start of elephantiasis of the penis. The scrotum may be quite normal. Circumcision of the ordinary variety is very unwise in these cases. It should be remembered that the inner layer of skin of the prepuce has a lymphatic drainage going into the deep penile lymphatics. It is desirable in these cases (Fig. 126) to undertake what may be called a "basal circumcision," which is a most suitable operation for these cases. All the inner skin of the prepuce is retained and a circular incision is made in the skin corresponding to the orifice of the prepuce. A second incision is made about 1 in. from the base of the penoscrotal junction and all the intervening pathological tissue between the two incisions is removed.



FIG. 126



FIG. 127

Fig. 126—Elephantiasis of penis before operation. Scrotum is not involved.
Fig. 127—Basal circumcision for elephantiasis of penis after operation. Same case.

This operation is precisely what the patient desires and the best description he can give to indicate his needs is a "circumcision" which is moderately accurate. After the pathological tissue is removed the inner skin of the prepuce is retracted back to cover the shaft of the penis and sutured to the remaining area of skin at the junction of the middle and lower third of the penis. Fig. 127 shows the same case as in Fig. 126 after operation of this sort. The ultimate result was satisfactory considering the nature of the condition. The skin of the prepuce stretches quite easily to the required extent. It is very detrimental to a patient with early elephantiasis of the penis to have the inner layer of skin of the prepuce removed by an injudicious circumcision.

Ample opportunity is afforded to junior surgeons to try the various methods of circumcision advocated. Some of these are far from satisfactory and can be improved upon. Suturing dressings on to the circumcision wound is very unsatisfactory and causes quite unnecessary *discomfort*. *Anæsthesia* is not required for baby circumcisions, as infants cry quite as much when given an anæsthetic as when they are circumcised quickly without one. They invariably

applied with the middle and index fingers, one hand being placed on each side of the penis and with the two thumbs pressed on to the glans in a downward direction The œdema is reduced by the pressure as the fluid is slowly pressed under the constricting ring, and the prepuce can then be drawn forward again to the normal position Before attempts at reduction are made the parts should be adequately cleaned Reduction is facilitated if liquid paraffin is applied to the glans If the reduction cannot be secured in this way it may be facilitated by the injection of 1 c c of hyalase solution into the œdematous area Hyalase has a liquefying effect on the high protein content of the fluid in the swelling and so helps to make reduction easier If ulceration of the constricting ring has already occurred it is better to undertake a circumcision, as the case is already infected In order to ensure a neat and symmetrical circumcision in these cases the blade of the scalpel is initially drawn round the swollen area on the inner side of the prepuce which is at present inverted, at a distance 2 cm back from the coronal sulcus This leaves an adequate remnant of the inner prepuce skin, a second circular incision is then made proximal to the constricting band keeping in mind the 60 degree line of angle of the lateral aspect of the coronal sulcus with the shaft of the penis With these two incisions well placed the constricting band of skin can then be divided between them The band of skin between the two incisions is removed by careful dissection The part is then well washed again and four fine catgut sutures applied to approximate the edges of the wounds, being placed in the dorsal, ventral and two lateral positions A small dressing is applied and penicillin is given to counteract infection The operation is seldom attended by any complications

There are two further additional indications for circumcision on medical grounds Circumcision reduces the rate of venereal infection to some extent Much venereal infection could be avoided if patients used soap and water following exposure to infection Circumcision is highly desirable particularly in communities where there is a high rate of venereal disease Uncircumcised European patients resident in the tropics, who show a marked tendency towards sweating of the palms of the hands and soles of the feet also frequently exhibit an abnormally high degree of dampness about the glans penis This condition is not devoid of danger and it ultimately gives rise to a condition comparable to leucoplakia and this may be followed in a fair proportion of cases by carcinoma of the penis

Malignant disease of the penis is seen not infrequently in uncircumcised indigenous patients in the tropics The incidence is much higher than that seen in Europe The incidence is noted by Helman [6] to be very high indeed in South-west Africa Wynder [7] strongly advocates circumcision as a routine procedure in all male children in view of the fact that it has been noted that the incidence of carcinoma of the cervix of the uterus is much higher in the case of women who are the wives of uncircumcised men than in women who are the wives of circumcised men This is a most important observation There is evidence to suggest that the incidence of carcinoma of the prostate is somewhat lower in circumcised as opposed to uncircumcised males (Ravich [8]) This appears to be the case also as noted in African communities where circumcision is or is not practised No personal figures are, however, available to prove this

encountered by doctors with limited experience, suggests spreading the prepuce with a sinus forceps and, after spreading, applying a clamp forceps just distal to the glans while the prepuce is drawn forward Before the excess of *prepuce is cut* off three through and through catgut sutures are put through all layers of the prepuce This ensures accuracy of application and after these are inserted the prepuce is cut off beyond them The clamp forceps is then removed and the ligature material is divided in the position between the opposite sides of the remaining skin and so the six sutures *in situ* are tied This method is quite a good one and is illustrated in Fig 128 If some bleeding occurs after the retaining forceps is removed the vessel can be caught by a forceps which is applied after the outside

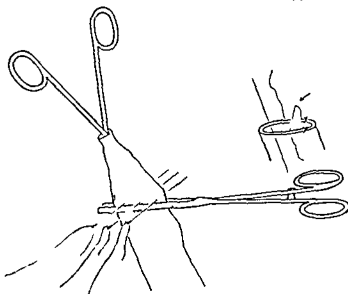


FIG 128
Diagram of circumcision by Van Beukering s method

skin is pulled somewhat proximally This does not disturb the ligature material which is tied when satisfactory hæmostasis is ensured

A method used personally for many years and with entire satisfaction giving an excellent cosmetic result is undertaken as follows (Fig 129) the prepuce is *initially retracted completely back from the glans penis* Initial dilatation of the prepuce may be required before this can be done It is essential to remove all adhesions between the glans and the prepuce All smegma is cleared away Sterile liquid paraffin is then applied to the glans and the prepuce again replaced to the normal position Two artery forceps are then applied to the foremost part of the prepuce taking a small grip only with one forceps at the dorsal aspect and the other at the ventral part The prepuce is then pulled forward holding the artery forceps and cut off through all layers in one full cut using heavy bladed scissors The optimum angle of the section is at 60 degrees with the line of the shaft of the penis This angle corresponds to the normal angle made by the sides of the coronal sulcus with the base line The position of the scissors cut is such

stop crying after the procedure if given a breast feed. An anæsthetic may have to be given if the mother particularly requests one. Circumcision can be undertaken in adolescents and adults in most cases without the use of any anæsthetic but the procedure must be undertaken by a precise and rapid method which is safe and gives a uniformly neat result. The willingness of an adolescent or an adult to accept circumcision without anæsthesia depends very largely on his desire to be circumcised. With some personal self control and a little instruction about mental dissociation during the procedure this is all that is necessary. A considerable factor in determining the intensity of pain is the element of fear. If patients are frightened or are being circumcised on advice given rather than by request, they are usually better given a general anæsthetic, as they may otherwise be unco-operative.

Local anæsthesia in patients under the age of 20 years is not very satisfactory. Spinal anæsthesia is very satisfactory in adults using 1 c c of stovain or a similar dose of heavy nupercain, but the patient needs to be admitted to hospital for three or four days if spinal anæsthesia is used. Caution must be exercised in giving general anæsthesia to out-patients without adequate preparation as in many cases they have taken food before coming to hospital even in spite of instructions not to do so. Intravenous barbiturates are considered not entirely safe for circumcision operations and although no serious accidents have been encountered in cases personally dealt with, very alarming reactions have been noted when they were used by others on occasions. On one occasion a patient sustained an unduly long cessation of breathing, and cerebral anoxæmia may give rise to marked mental disturbance. Intravenous barbiturates are thus better avoided for circumcisions. In cases of ulceration of the prepuce where circumcision is considered desirable, a preliminary dorsal slip may be suitable and useful as a preparation for circumcision. This permits of adequate cleaning which would not have been possible because of an inability to retract the prepuce. The dorsal slit should be only sufficiently long to permit retraction, it should not go as far as the coronal sulcus for if it does so a neat circumcision cannot be obtained so easily. If the prepuce can be retracted prior to circumcision a dorsal slit should not be undertaken.

With the patient under an anæsthetic the use of very firm preliminary pressure applied to the prepuce with a bone forceps as a means of producing a hæmostatic barrier, before sectioning of the prepuce at the line of crushing, is attractive but it is very likely to be followed some hours later by severe hæmorrhage. The adhesion of the inner and outer layers of prepuce produced by the crushing action of the forceps does not always stay together and bleeding then starts. The insertion of sutures through the edges tends in itself to pull the adherent edges apart. The method is therefore not entirely satisfactory.

There are many old fashioned instruments designed for circumcision operations to ensure accuracy and safety in the procedure. A clamp with a divided blade was popular at one time and this is a good instrument. The clamp protects the glans penis from injury and the vent down the middle of each arm of the clamp permits of the insertion of a scalpel with which the incision is made. The angle of incision can be carefully decided upon, 60 degrees to the line of the penis is the optimum. Van Beukering,[9] appreciating the difficulty

approximately a square of tissue available quite a large ulcer can be covered The graft is held in position by sutures which keep it well stretched and help to maintain it in good position The graft after application is covered with a vaseline gauze dressing and left alone for a week The limb is put on a splint to ensure complete rest and the patient is kept in bed The ulcer should be reasonably clean before the graft is applied Dressings and antibiotics being used before and after the operation, a high proportion of the grafts are successful The patients welcome the circumcision and the added advantage of closure of the ulcer increases the popularity of the procedure which is worthy of consideration, especially in country places, where leg ulcers are most commonly seen

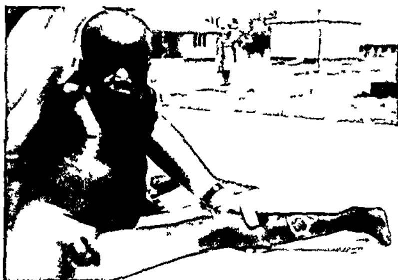


FIG 130
Leg ulcer grafted with skin of prepuce following circumcision
(Photograph by kind permission of Dr R W Kanzler)

RITUAL CIRCUMCISION OF FEMALES

It would appear appropriate in dealing with surgery in the tropics to make some mention of the subject of female circumcision, for although this practice is not limited exclusively to the tropical world, it is certainly seen most commonly in Africa The essential of the operation is the removal of the clitoris and the lesser labia of the vulva There are many modifications of the procedure This ritual custom, like male circumcision, is of great antiquity It is certainly pre-Islamic in origin Laycock [11] mentions that the practice is referred to by Strabo many centuries before the time of Mohammed (A D 600) These operations are undertaken over vast areas of the world The practice in Africa is seen mostly in up-country areas where the tribal systems are still most influential In Egypt it is practised in a high proportion of females of all social classes An extract is

that it goes through the position of the middle of the prominence made by the glans penis under the prepuce The end of the cut should reach the base line just as far forward as the tip of the penis This prevents the artery of the frenum being cut It is usually desirable to tie one dorsal vessel on each side of the midline The liquid paraffin prevents the glans being cut as it slips back when the sides of the prepuce are pressed together just prior to being cut through The correct amount of residual prepuce is left to ensure an excellent cosmetic result In infants two 0000 catgut sutures are inserted, one ventral and one dorsal, while in adults an additional lateral suture is inserted on both sides If the prepuce tissue is unduly thick in male adults an initial cut on the dorsal aspect may be made with the scissors, and through the V perforation made the prepuce may be removed with a separate scissors cut down each side, this however is seldom necessary if large heavy scissors are used

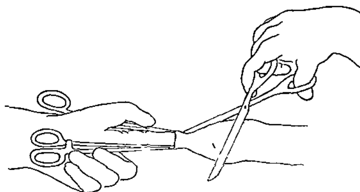


FIG 129

Diagram of circumcision by single cut method, using scissors Injury to glans penis prevented by preliminary application of liquid paraffin to glans

Having undertaken many hundreds of cases of circumcision by this single-cut method without any mishaps and with very neat results, it can be recommended with confidence The fine catgut ligatures inserted do not need to be removed as they come off with the dressing after about eight days Very little dressing should be applied in adults and none in infants The infant should have a napkin put on after the operation and the mother should be instructed to bath the baby daily as though he had not been circumcised In this way the wound is cleaned daily without handling dressings and the wound is usually clean and dry in eight days Babies treated in this way heal most satisfactorily and quickly

Apart from the ritual, medical, and æsthetic objects of circumcision, a further consideration should be kept in mind, namely, that the prepuce may be most useful as a full-thickness skin graft in plastic repairs of skin defects following ulceration and trauma Kanzler [10] has made use of the prepuce in skin grafting of leg ulcers which are slow in healing Fig 130 shows a grafted ulcer using this method After adequate cleaning and removal of the prepuce the cuff of tissue is cut open The inner layer of prepuce and the excess of areolar tissue are removed With

to intercourse and this subsequently had a ritual significance attached to it as a counterpart to male circumcision which marked those receiving the rite as members of a distinctive social group with tribal loyalties and affiliations Wilson and Sutherland [15] carried out an investigation to see if female circumcision influenced the age of onset of menstruation Observations were made on three groups of females, one from up-country Sierra Leone, circumcised, a group from detribalised African girls from Freetown who were uncircumcised, and a third group from England, uncircumcised The conclusion reached was that female circumcision did not influence the age of onset of menstruation at all The age of the menarche was the same in all groups

It is difficult to obtain photographs of the ceremony being carried out, as the procedure is usually carried out after darkness either at the time of the new moon or the full moon Males are usually excluded from the ceremony, as is understandable In so far as ritual practices are of some value in certain circumstances in organising society, this procedure may not be without some value in a tribal system

The operation is sometimes undertaken in female infants, as amongst the Fullani people of Futa Jallon, West Africa It is most commonly undertaken in other tribes during adolescence between the ages of 10 and 14 years before pubic hair develops freely In Ethiopia the practice is undertaken at the age of 7 years (Melly [16]) Amongst some peoples it is undertaken after marriage—Masai, East Africa—while amongst Swahili people it may be undertaken after the birth of the first child Having personally noted the practice over many years, it would seem that the most likely reason for its origin was originally to remove obstruction to the vagina caused by excessively large clitoris and lesser labia in people who show a natural tendency to gross hypertrophy of these parts This is most common in females with a tendency to virilism or excessive androgenisation In these cases there is usually a slight overaction of the suprarenal gland In people of the Middle East and Ethiopian origin who show a marked tendency of this type, there is frequently a pronounced pre auricular distribution of the hair of the head as commonly seen in young women from that part of the world Amongst the Hottentot people of South west Africa there is a gross hypertrophy of the lesser labia and clitoris apparent Apart from these groups mentioned, most African female patients have lesser labia conspicuously smaller than that seen in European women

During the sixteenth century early missionaries from Rome are said to have opposed the native practice of female circumcision in Ethiopia (Sequeira [17]), referring the matter for guidance to the College of Propaganda in Rome This body sent a surgeon to investigate the matter and he, having examined a large ... of the

their removal was a justifiable and desirable procedure ... practice was therefore dropped

A more recent agitation occurred in East Africa at the instigation of a religious body, and the matter was brought to the notice of the English Parliament with a view to urging the local administration, if they could not stop the practice, to pass

appended indicating only a few of the African tribes where the practice is commonly seen to indicate its prevalence. The list has been compiled from personal experience and the writings of others (Sequeira [12]).

Outside Africa it is seen very frequently in Arabia. In South America it is undertaken to some extent in Peru and Western Brazil. In North America it is undertaken only in Eastern Mexico to a limited extent. In Asia the practice is noted in Mohammedan communities spreading from the Middle East through Afghanistan to Pakistan. Although the practice is more commonly seen amongst the Mohammedan peoples it is not necessarily of Mohammedan origin or part of their essential religious ritual. Many Mohammedan communities do not practise it at all, such as the Jolloff people of Senegal and Gambia. The ritual is undertaken amongst some of the groups of the Malayan Archipelago and in some of the islands of Indonesia. Whether it has arrived by that route or not, it is also noted amongst the aboriginal peoples of Australia. In other parts of Asia the practice is very rare. Cases are known to occur in Eastern Siberia, in the Kamchatka Peninsula area of Asia. It is not practised in Japan, China or Formosa as far as is known.

In Europe the practice is extremely rare; it is noted in a religious sect in Russia known as the *Skoptozy* as recorded by Worsley [13]. These women practise a very extensive ritual circumcision when taking their vows, one being a vow of celibacy. The Russian word *skopetz* means eunuch, and implies a member of a sect practising castration (Segal [14]) or other sterilising operation.

The essential object of circumcision in females is uncertain and therefore many suggestions have been made to account for the practice. There is little doubt that the main object which keeps it going is the mysticism of a ritual initiation to full membership of social groups. For the sake of brevity a list of suggested reasons for the practice is given without elaborating on their possible validity.

1. To ensure chastity before marriage.
2. To decrease the risk of mania—nymphomania.
3. To reduce sex feelings and masturbation.
4. To improve and facilitate cleanliness.
5. For the purpose of increasing fertility.
6. On æsthetic grounds where the structures are hypertrophic.
7. To remove obstruction to sex intercourse, where lesser labia are very large.
8. To tighten the vagina, increasing sex feelings.
9. As ritual initiation into social groups, tribes, religious orders, etc.
10. To confer the right to speak at public meetings in some tribes.
11. To permit of admission to the mosque in some communities.
12. Because girls cannot get husbands in some tribes without circumcision.
13. To attain the right to inherit property as in Egypt.
14. To avoid the "disgrace of the uncircumcised" where the practice is customary.

It will be seen that the reasons are very conflicting—the most likely being that originally the procedure was undertaken with a view to removing a barrier

entirely by complete excision and total infibulation or colpocleisis The urine is temporarily collected in the reconstructed compound bladder and vagina and passed into the rectum through the rectovaginal fistula Control is maintained by the rectal sphincter muscle and in this way the patient is relieved of her perpetual urinary and fæcal incontinence This operation has been undertaken on about seven occasions personally In one case the patient, initially well pleased with being relieved of her incontinence, returned about four years later asking to have the vagina reopened The position had to be explained to her very carefully to induce her to leave the operation alone

The operation of ritual circumcision is undertaken with a knife, razor or sharpened spear head When infibulation is undertaken, as in Somaliland, the



FIG 131
Photograph of vulva of circumcised female patient

practice of using thorns from bushes to suture the incised lesser labia together after operation is not uncommon In some instances there has been development of a growth-like mass of mycetoma origin Mycetoma is most commonly seen about the foot and ankle It almost invariably follows an injury by a thorn This condition is seen most commonly in the semi-arid areas of the South Sudan and Northern Territories of West Africa In the Sudan area following female circumcision the introitus is closed in its upper three-fourths, using locally made sheepgut The number of deaths following female circumcision is probably very small indeed, in respect of the immediate operative procedure Vaisey [5] reported one such case where legal proceedings were undertaken against an individual performing female circumcisions The operator was a person recognised as "suitably qualified," being the recognised circumciser of the community, and was not convicted

laws giving protection to any female who did not wish to be circumcised, being a member of a tribe where the practice was usual Following kidnapping and forcible circumcision of one European woman the agitation stopped Forceful obstruction to tradition is a dangerous undertaking, it may, however, be justifiable to point out the admitted dangers of ritual procedures, leaving the modification of tradition to the good sense of the senior members of any community

The nature of these operations is not well understood in the medical teaching centres of most non-tropical countries as the practice is never encountered Fig 131 shows the local appearance of a patient who has had a ritual circumcision undertaken during ritual ceremony Five different procedures may be undertaken in female circumcision

1 Removal of the clitoris alone
2 Excision of the clitoris and the lesser labia
3 Excision of the clitoris with incision of the lesser labia edges followed by suture of the two sides causing infibulation of the upper two-thirds of the vagina
4 Excision of clitoris and lesser labia with an additional lateral incision on each side of the lower third of the vagina This is termed circumcision with "introcision" or incision about the introitus
5 Massive excision of clitoris, lesser labia and part of major labia with suture of the two sides leaving only a pencil-sized opening at the inferior commissure position to permit of escape of urine and menstrual blood

Type (2) is that most commonly seen The more extensive operations are seen most commonly in Somaliland and Abyssinia The practice also extends into East Africa This extensive type of operation has not been noted in West Africa The term "infibulation" is reminiscent of the Roman practice of introducing a fibula or safety-pin like clasp through the female prepuce Infibulation refers to the putting in of the pin or fibula Infibulation really means "pinning up" It was supposed to ensure chastity during the absence of the male partner

Female circumcision has been undertaken personally on a few occasions in special circumstances, *e g*, in the case of young male hermaphrodites who have external genitalia simulating the female type, but with some hypertrophy of the lesser labia and clitoris This type of operation appeared to be justifiable and a most suitable procedure in these cases for, if it is not possible to turn the child back into a normal male subject, it is certainly desirable to assist in feminisation where secondary psychology is almost invariably of the female type as already described under hermaphrodism

Any operation which produces scar tissue to a sufficient extent to interfere with subsequent child bearing must be considered a surgical miscalculation, with disadvantages outweighing any possible advantages An operation very comparable to an extensive female circumcision may have to be carried out occasionally in patients over the age of 50 years, who have sustained irreparable bladder damage and rectal damage in addition as a result of obstructed childbirth In these cases with both very large vesicovaginal fistula and rectovaginal fistula in addition, where neither can be closed by local repair, it may be best to close the vulva

third of the vagina during the initial ceremonial procedure, there is liable to be a vaginal stricture present. In these cases a lateral episiotomy on both sides is probably necessary for delivery.

The surgical complications occurring after female circumcision are hæmorrhage, sepsis and damage to the urethra, while at a late stage when scarring has taken place urethral stricture sometimes requires dilatation. In some cases the stenosis is so extreme where the urethra has been cut that urine is evacuated through a pin-hole opening only and retention of urine may occur. It is said to be extremely difficult in these cases to relieve the retention of urine by catheterisation where infibulation has taken place. The urethra is not visible or easily accessible without undertaking defibulation. Something comparable to urethral injury by defibulation has been seen, as already mentioned, where the urethra is cut by an unqualified mid wife attempting what might be called an anterior episiotomy in cases of obstructed labour in an abortive effort to open the lumen of the vagina in the anterior position. Where female circumcision is undertaken on adult pregnant women the greater danger of hæmorrhage following this operation is appreciated by local operators. Where there is extensive scar tissue present Cæsarean section may be essential for delivery of a live child. This is sometimes necessary amongst the Kassina and Nankani people of Ghana amongst whom the operation is more extensive than in other people in that area. Unfortunately in up-country areas in West Africa, patients often attend ante-natal clinics for the first time when they are already in labour.

Pseudo-elephantiasis may occur following female circumcision which involves the major labia. Whereas this has not been seen in cases observed, Worsley [13] reports that this complication occurs in almost 50 per cent. of cases in the Sudan. Vaginal stricture formation occurs most commonly following circumcision if introcision has been used in addition to removal of the clitoris and lesser labia. It has been suggested that, following introcision, the insertion into the vagina of rock salt used as a hæmostatic can act as a factor in producing extensive scar tissue and stricture formation. A further complication of this extensive procedure is the onset of dyspareunia due to extensive scarring. Sepsis within the vagina following the operation has been known to give rise to calculus formation in that position. This is probably due to deposition of urinary salts as is the case in urinary calculi with cystitis.

Damage to the rectum during defibulation is a serious complication. *Mycetoma* formation in the wound where suture by thorns is employed is a recognised complication, although it is rare. If stricture formation is extreme the patient may ultimately suffer from hæmatocolpos. Death following ritual circumcision is not common. The greater dangers lie in the production of obstructed labour due to extensive scar tissue formation, where the infibulation types of operation are carried out. Following ritual circumcision the initiates are usually given small presents and decorated to indicate the importance of the occasion. In Gambia a small piece of blue cloth is tied around the head above the eyebrow level—this is termed the *kalo*.

The position of the patient during this ceremony probably varies from one community to another. The method of holding the child used in Senegal and Gambia is known as the "*interlock position*." The girl is held by an adult female relative who

In some areas hæmostasis is ensured by the application of a split cane applied to the edges of the lesser labia which have been incised. In cases personally seen in Upper River Gambia, cloth dressings were used following the operation. Amongst the Kikuyu people of Kenya, where extensive circumcision is practised, partial infibulation occurs in a high proportion of the cases although sutures are not used. A large amount of tissue is removed and the initiate has the legs tied together for a week after the operation during which time the opposed edges, being undisturbed, unite by granulation tissue.

Where female circumcision is undertaken in infant girls, as seen amongst the Fullani people, the cosmetic results are excellent. No scar tissue can be seen at all in many cases when the girl is older. The clitoris and lesser labia are completely absent and there is no evidence in most cases of any adhesion between the skin and the bridge area of the pubic bone. There is also no evidence of any remnant of the clitoris remaining as is seen in Mandingo patients where the operation is undertaken at an older age—7 to 12 years. In no case where clitoridectomy had been undertaken in infancy has interference with childbirth been noted. The operation undoubtedly predisposes to greater cleanliness and appears to have no disadvantages if the clitoris and lesser labia alone are removed.

The argument that female circumcision is undertaken to decrease sex feelings is probably not correct. The incision in this operation is usually undertaken during the ritual ceremony by an incision from above downwards, while the glans clitoris is pulled forward. If the incision is made from below upwards, as is sometimes done amongst the Wangara people of West Africa, a large tongue-like piece of skin may be inadvertently pulled off the front of the pubis with the subsequent formation of an ugly scar on the front of the pubis with keloid formation in some cases. Following female circumcisions of the Grade 1 or Grade 2 types there are seldom any complications of a serious nature. There is usually slight sepsis in the wound, but this settles down quickly and the scar is of the flat type; keloid formation does not occur unless the fat of the major labia or pubis is cut into. Only if there is extensive scarring does this interfere subsequently with stretching of the parts in childbirth. If the anterior commissure of the vulva tears during childbirth as a result of extensive local scar tissue present following circumcision there may be very severe hæmorrhage from the external pudennal artery which is located in this position.

No cases of infibulation have been seen personally in West Africa. The extensive operation is damaging and followed essentially by the formation of much scar tissue. Following infibulation in adolescence, defibulation is necessary before or after marriage to permit sex relations. A further and more extensive defibulation is required before the birth of the first child per vaginam. Obstructed labour almost invariably results if adequate release of tissue is not ensured with the second defibulation, before the second stage of labour. Defibulation during childbirth is a dangerous operation because of the extensive blood supply present in the local parts at that time. If defibulation is undertaken with an upward incision the urethra can be damaged or the vesicovaginal septum perforated. If an injudicious stroke is used from before backwards the urethra and the rectum will be injured. Where introcision or lateral incisions have been made in the lower

marks Likewise no deaths have come to notice, but in areas where registration of deaths is not compulsory such cases might well be overlooked Skin incisions alone are unlikely to be fatal from hæmorrhage

Filing of teeth into points with or without subsequent staining is still commonly undertaken in some areas of East and West Africa and Madagascar It is also seen in Indo-China and Java No complications have been observed following this practice The method does not necessarily predispose to the onset of dental caries about the filed areas

The practice of venesection and mixing of bloods of different individuals as a token of 'blood brotherhood' has not been noted personally, although it is still employed Any ritual operation of a cutting nature has an associated risk of infection with particular emphasis being laid on tetanus, when non sterile instruments are employed



Fig 132
Thickened kelo d scars in tribal marks

In certain parts of Asia severe trauma of the vagina and perineum are still caused by ritual defloration ceremonies on juvenile female persons Some patients require treatment as indicated under the section on Genital Injuries of Females

Amongst the aboriginal peoples of Australia the practice of defibulation of the urethra in male subjects has been practised during ritual ceremonies, the whole length of the anterior urethra being opened from the external urinary meatus to the perineum The reason for this ritual is uncertain, it produces a form of sterility This would appear to be a very traumatising procedure and likely to be associated with gross blood loss Considering the sparsity of writing on the subject it would appear that the practice is not common although it is well known Total repair of such a condition would necessitate a major plastic procedure following suprapubic cystotomy for deviation of the urinary stream An operation of the Denis Browne type for hypospadias might reasonably be employed, if closure of the defect could not be achieved without release of local tissue

Cosmetic adornment is either of a temporary or permanent nature and appears to be almost universal amongst women, it is employed to a much lesser extent amongst men Ritual hair cutting is of no surgical importance Many of the hair cutting designs seen in female African children particularly in the Senegal area are very pretty Temporary facial cosmetics are used more frequently amongst women in England than in Africa Permanent facial cosmetic tattooing is seen almost exclusively in tropical countries, particularly in Polynesia and South

sits behind her on the ground or on a low stool The arms are crossed on the front of the chest and held there or gripped at the wrists with the arms in the straight position by the sides by the restraining adult helper The girl's legs are held apart by the guardian who puts her thighs over the girl's separated legs, placing one leg inside the knee position of the girl on each side In this very efficient manner one person alone obtains an excellent grip of the patient to be circumcised, controlling the arms, legs and body Bone injuries are not likely to occur if this position and method of holding is adopted even if the child struggles Other methods of holding are less safe

The practice of ritual circumcision is most unlikely to become obsolete at any time in the future though it may decrease with the advance of education It is therefore incumbent on medical men working in tropical climates where the practice is customary to be reasonably familiar with these procedures undertaken and the complications which may follow them and require treatment at hospital

FURTHER RITUAL AND CUSTOMARY PROCEDURES

Considering ritual and customary practices in their widest sense, it is desirable to mention further procedures which have associated with them surgical complications requiring treatment at hospital Observations may also be made from them which, if properly used, may help in the diagnosis of certain diseases

Tribal markings about the face and body with characteristic patterns are still commonly undertaken in many tribal systems of Africa and South America They are of some value in relatively small communities, while they may be a factor causing a lack of unity where attempts are being made to integrate larger political units With world-wide increase of education these distinctive markings are being used less frequently In most instances tribal marks are put on children during the first and second years of life Keloid scar formation seldom if ever occurs in the very young children of pigmented parents if the children are marked under the age of 2 to 3 years Most of these tribal marks produced by incisions give rise to narrow flat scars without any residual thickening The designs are standardised for each individual community Many of the markings are extremely pretty In certain districts tribal marks are put on at an older age when keloid formation is liable to follow the incisions In addition, ash of various forms—burnt ground nut, etc —may be rubbed into the wounds with the express intention of producing some degree of keloid thickening (Fig 132)

Requests are occasionally received to have a keloid scar in a tribal mark removed These keloids are likely to be much more pronounced if the incision crosses the normal facial skin creases or Langer's lines It should not be forgotten that the line of a tribal mark can sometimes be usefully employed as a surgical approach for the removal of a deeply seated tumour mass of small size about the face If such a line can be employed the necessity of an additional scar is obviated Care should also be taken when operating about the face not to leave, unwittingly or intentionally, a scar simulating a tribal mark, as to do so might cause offence to one not of the people that the mark would suggest No cases of serious hæmorrhage have been noted in children following the making of these tribal

to the eyelids This procedure is unfortunately a potent means of spreading trachoma in areas where this eye disease is common This practice is worthy of mention as it is the starting point of a serious condition which has late surgical complications necessitating operative remedial measures for entropion and ectropion In this way a social custom becomes a public health danger

In warm climates where the body is freely exposed it is not unusual to see extensive patterns cut on the skin of the abdomen or the back, either as radiating incisions about the umbilicus, or in the form of straight lines or feather-like patterns These are usually of a superficial nature and seldom give rise to any complications In some instances, however, these patterns may be very extensive and associated with marked thickening of the scars Fig 133 shows such a case If abdominal scarring of this type is extensive it will be found on opening the abdomen, when such is necessary for other reasons, that there are frequently massive adhesions of peritoneum fixed to the posterior surface of the abdominal wall beneath the scars Extensive abdominal scarrings thus are associated with intra-abdominal complications such as intestinal obstruction, or discomfort due to traction on adhesions as the intestines move about with the digestive processes

Perforation of the ears of female children is an almost universal practice in Africa and most other tropical countries If the operation is undertaken soon after birth little trouble arises, even in the presence of some sepsis If perforation is undertaken in adolescence or during adult life, in heavily pigmented peoples, it is very likely to be followed by keloid formation, even though all possible aseptic precautions are taken Late keloid formation about the lobe of the ear is more common at the back or inner aspect of the lobe (Fig 134) than the front or outer aspect The reason for this is undoubtedly that the earrings are so made that they are inserted from without inwards and the injury starting the keloid occurs closer to the inner part of the perforating channel than the outer part The rather rough wire of the earring, having gone partly through the perforation, becomes caught in the skin at the inner aspect just before it emerges, it is then forced through and a small area of the skin tears The keloid then starts at this position Ear keloids following removal are very liable to recur In some instances it may be more satisfactory where large bilateral ear keloids are present to remove the lobes of the ears and repair them very carefully after washing the open areas with detergent solutions to remove loose fatty particles Removal of keloids from any part of the body should be undertaken in hospital, so that the risk of infection in the wound is minimised

Perforations of the upper and lower lips as seen in many parts of the tropical world are usually undertaken in early childhood In no case encountered has a keloid been seen following this customary procedure Fig 135 shows a patient with ivory pegs inserted through perforations of the upper and lower lips It is usual for the Koniagee tribe of Senegal to perforate the nasal septum close to the nostril position A small silver metal ornament is put through the perforation and this rests on the upper lip In India a perforation of the ala of the lower part of the nose is seen It is used for holding an ornamental jewel The extent to which skin will spread when perforated and stretched by ivory discs being inserted forcibly is quite remarkable This is seen in some of the up-country peoples of

America, although it was popular at one time amongst Eskimos Like tribal marks the designs are very numerous Tattooing appears to be essentially cosmetic and is not often used with tribal distinction Extensive tattooing of the face was not uncommon in the past amongst the Maori people of New Zealand Ritual genital tattooing was practised in the Pelew Islands

Tattoo markings in African women are seen most frequently about the face with a dark blue spot placed beneath the lower eyelids Various stellate designs are used over the prominence of the zygoma on each side and striate marks radiating from the outer sides of the mouth are not uncommon The word "tattoo" is derived from the Tahitan word *tatau*, and no doubt the practice is popular in the Society Islands of the Southern Pacific Ocean Tattooing of various parts of the body is popular amongst young men in European countries, it is noted in about 10 per cent of male adult subjects in England It is much less frequently seen amongst women in Europe although there has been a considerable increase in the practice amongst young girls in England in recent years Amongst men tattoo markings are usually put on about the arms or chest, less frequently elsewhere, but are never seen on the face Tattooing has been made illegal in Japan

Those with tattoo marks on the body sometimes wish to have the marks removed If a tattoo mark is excised, skin replacement by grafting is necessary and a conspicuous mark is necessarily left Small tattoo marks may be obliterated to a considerable extent, if not completely, by further tattooing with white material In recent years the practice of tattooing has been used to some extent in plastic surgery to rectify the colour or shade of a skin-grafted area, so that it approximates more closely to the surrounding tissues

It is not very unusual to receive requests for the obliteration of depigmented areas of the skin in African subjects It would seem that tattooing these areas with a suitable shade of brown pigment would be more satisfactory than excising the areas with the risk of keloid formation This method has been undertaken personally on a few occasions particularly in African schoolboys who are very conscious of the disfigurement of depigmentation which may follow third degree burns No keloid formation has ever been noted in tattooed skin of patients with brown skins A more even result can be obtained if an electric rotatory tattoo apparatus is used than if multiple punctures are employed, using manual insertion The necessity of asepsis in tattooing is obvious Three sailors who underwent tattooing while visiting South East Asia, soon after arriving home in Europe reported that they felt soreness in the tattooed area, two of these persons developed leprosy in the tattooed area, the third one was being kept under observation but did not develop the disease

In many parts of Africa and in the Middle East, it is not infrequent for women and men to use black metallic powder as a cosmetic application for the upper and lower eyelids They claim that its use is restful to the eyes when the sun is very bright, and this may be so The powder is frequently carried in a small container with a narrow neck. It is closed with a cork to which is attached a "dipstick" This is used as an applicator for the powder on the eyelids It is not unusual for this container to be handed round as a polite custom in West Africa amongst friends, all of whom use the same stick for applying the powder

West and East Africa The lobes of the ear and the upper and lower lips are perforated and ivory discs of increasing sizes are forcibly inserted Closure of these large skin perforations has not been attempted, but in view of the observation that those perforations which are not continually stretched tend to become much smaller, conservative measures should be adopted for a considerable time before any attempt at plastic surgery is made Many patients have been seen where a perforation scar of the lips exists, but with no apparent opening through it, certainly a fine oiled probe will not go through the pin-point depression in its centre

Cases are still seen where incisions have been inflicted in the fetish belief that they are necessary for the arrest or prevention of disease or misadventure The practice of removal of the terminal phalanx of the middle finger of the left hand is a well-known practice amongst the Bantu people of South Africa Laubscher [2] indicates that the absence of this phalanx can usually be taken to indicate that the individual had some form of chronic illness in infancy, possibly repeated convulsions If the tip of the finger is removed in this way it is encumbent on this person, when an adult, to have a similar phalanx removed in all his male descendants Following a crude amputation of this kind, undertaken by an unskilled person, a further amputation may be necessary in order to remove some bone to which the terminal scar is fixed without any underlying pulp tissue and so causing pain Ploss and Bartels [17] also indicate that ritual finger amputations are also occasionally undertaken in Southern India and Northern Australia

Constricting bands in the form of metallic or stone bracelets are sometimes seen above the elbows and these cannot be removed by the patient himself They are put on in early life, but as the individual grows up they cannot be removed due to increase in size of the lower end of the humerus If ulceration about such bands occurs or there is interference with the lower arm circulation the band must be cut through or broken off for removal

A peculiar custom of ritual significance is still found in parts of Indo-China where a long malleable metal strip is wrapped round the neck of adolescent females in the form of a long collar This produces a giraffe-like appearance, gradually lengthening the neck, as successive bands are applied over several years Following this procedure the neck muscles become atrophic and the bones become soft When the band is removed for replacement by a longer band the patient may be unable to support the weight of the head by the weakened musculature and fracture of the cervical spine has been known to occur Because of the ritual associated with this strange custom, it is continued and accepted with pride by successive [illegible] The danger of this custom should be appreciated As the condition [illegible] of increasing length, rehabilitation [illegible] port so that a gradually increasing [illegible] l function and strength might be ensured without undue risk [illegible] of the world, encircling of the individual legs by a continuous metal coil from several inches above to several inches below the knee, is practised The patient is unable to bend the knees and there is ultimately a marked degree of disorganisation of the intra-articular structures



FIG 133
Keloid scars in abdominal tribal incisions



FIG 134



FIG 135

Fig 134—Ear keloid at inner aspect of lobe
Fig 135 Lip perforations with ivory pegs inserted

were convinced that if this operation was not undertaken they would die from a throat infection Between 1899 and 1951 45,000 uvulas were cut at one centre. What gave rise to this firm belief is uncertain, but the possibility of an outbreak of diphtheria in the district at some time in the past suggests itself The tip of the uvula was cut off with scissors while gripped with forceps There was a little bleeding only, the patient was given ginger to suck following this minor operation No anæsthetic was used The patients demanded this form of treatment even in the absence of active disease

In many parts of Africa the practice of making multiple small pre-auricular incisions as a treatment for chronic headaches still prevails amongst the people. In most cases the headaches are probably due to untreated chronic malaria

EXTRACT

Female Circumcision in Africa

This practice is widespread amongst African peoples It varies in extent and is closely associated with the tribal system *In some tribes the practice is ritual and customary and undertaken on all females while in other tribes only a small proportion of the females are circumcised*

The practice is found in the following communities

North Africa	*West Africa*		*Central Africa*		*South Africa*
Sonnini	Fullani	Susu	Somali	Lumbwa	Bantu
Kordofan	Mandinga	Kusasi	Meru	Wakuafi	Bavenda
Omebi	Wangara	Benin	Embu	Digo	Basuto
Serrazin	Bambara	Konkomba	Chuka	Teita	
Gulla Agan	Serrahuli	Gonga	Kikuyu	Kavuondo	
Gonga	Hausa	Moshi	Warangi	Giriama	
Kaffitscho	Kanjaga	Sissala	Wasikuma	Watenda	
Bayuda	Nankani	Dagomba	Masai	Wakamba	
Semnaar	Kassina	Youraba	Nandi	Kisii	
Harari	Bulsa	Grunshie	Kamasia	Kitosh Arabs	
Kababish	Fra fra	Ibo	Suk	Swahili	
Donakil	Kotokoli	Abaw	Elgoyo	Loango	
Dongola	*Dagati*	*Abuan*	*Nyerups*	*Bechuanas*	
Ethiopians	Lobi	Fgab Sobo	Sanuban	Wasambara	
			Dorobo	Wandorobbo	
			Sebei		

[illegible] king in West Africa [illegible] *This list might* [illegible] icate that female circumcision is a comparatively common practice in many parts of Africa No attempt has been made to collect details from other parts of the world The practice is well known in the Middle East and to a limited extent in Southern Asia It is common in some parts of South America

REFERENCES

1 MACCARTHY, D, DOUGLAS, J W B & MOGFORD, C. (1952) Circumcision in a national sample of 4 year-old children *Brit med J* 2, 755
2 LAUBSCHER, B J F (1937) *Sex, Custom and Psychopathology* London Routledge
3 LA FONTAINE, J (1955) Symposium on ritual circumcision of the Bagishu *E Afr med J* 32, 27
4 PANDE, I M (1955) Medical aspects of ritual circumcision *E Afr med J* 32, 28
5 VAISEY, Dr (1955) Female circumcision and medico legal aspects *E Afr med J* 32 28
6 HELMAN, J (1957) Some diseases amongst the Hottentots of South west Africa *Cent Afr J Med* 3, 143

In many parts of Africa children are still seen with unkempt hair and many linear incisions on the face not in compliance with any tribal markings, but indicative of a fetish procedure adopted in the superstitious belief that this form of treatment is a protection against illness In almost all these cases it will be found that the mother has lost all her previous children through some misadventure

Multiple incisions on the surface of the body, at the site of pain produced by disease, are very commonly seen These are often seen in the case of patients with chronic cervical adenitis, due to trypanosomiasis, who have multiple incisions over the posterior triangles of the neck It is also seen commonly over the spleen when it is enlarged This is seen most frequently in country areas, far away from the large towns, where medical services are less freely available Fig 136 shows such incisions in a small child and also an area where a burn-like mark is present due to a local application for the treatment of enlarged spleen The infant was brought to hospital suffering from tetanus of this latter wound Fortunately the infant recovered following large doses of penicillin and antitetanic serum The wound was excised Tetanus is always a mild risk in any surgical procedure in the tropics undertaken without adequate aseptic precautions



Fig 136
Multiple incisions over enlarged spleen followed by tetanus in wound

On first arrival in the tropics it was conspicuous that in the Senegal-Gambia area of West Africa a fair number of up-country people had a smooth scar of a circular type on the dorsal aspect of the left forearm, at a position where a wrist watch might be worn This was found to be due to a native vaccination carried out by the people themselves Scabs of convalescent smallpox cases were used as the inoculum It is believed locally that a mild form of smallpox could be developed without undue risk, giving permanent immunity to those vaccinated None of the persons so vaccinated showed any evidence of pitting of the skin suggestive of a generalised virulent attack of smallpox This practice, as far as could be determined, has been carried on from time immemorial

Mention has already been made of the practice of applying an actual cautery to cases of strangulated hernia and so relieving them of obstruction of the bowel but with the formation of a fæcal fistula This method may be undertaken by the people themselves as a last resort where no other help is available It is frequently successful in cases of the Richter's type of inguinal hernia, but is less likely to be successful where the involved loop of bowel enters the scrotum

Ribeiro [18] reports the frequency and insistence with which African patients in East Africa came for treatment with a view to having the uvula cut short They

13

Infertility in the Male and Female

FACTORS IN INFERTILITY OF THE MALE

THE average birth-rate in tropical climates greatly exceeds that found in most of the temperate parts of the world The rapid increase in population is largely overbalanced by the high infant mortality rates With improving knowledge of tropical diseases and public health measures, the present survival rate of infants born in the tropics has markedly increased The net result is that there is a vast and relatively rapid increase in the population in many parts of the tropical world

Amongst most of the indigenous people of tropical countries there is a great desire on the part of both the men and the women to have children This strong urge to breed accounts for a considerable part of the attendance at hospital in these places Almost all patients complaining of infertility are women In sterile marriages the woman is invariably blamed for the failure to have children If both parties are investigated, however, it will be found that from one-quarter to one-fifth of the sterile unions are due to infertility on the part of the male and the balance on the part of the female Green-Armytage [1] found, working in India, 1928, that 21 3 per cent of sterile marriages were accounted for by some defect in the husband More recently, since the introduction of sulpha drugs and antibiotics, Adatia,[2] also working in India, found the following results on investigating the male partners of eighty-two sterile marriages

1 Fertile, 43 9 per cent, 36 husbands
2 Subfertile, 23 2 per cent, 19 husbands
3 Non-fertile, 32 9 per cent, 27 husbands

In view of these findings and the large number of female patients who come to hospital requesting investigation for infertility or subfertility, it saves an enormous amount of time and work if the male partner is first investigated in all cases It is obviously useless investigating or treating the wife unless the husband is fertile There is a large number of factors influencing fertility, it is therefore desirable to have a reasonable standard on which to judge fertility in the male If there is no obvious disparity in sex relations between two partners and no evidence of clinical abnormality on initial examination, yet no pregnancy has occurred within one year of marriage, the patients may reasonably be investigated for subfertility Many partners in the tropics automatically separate if a pregnancy does not start within six months In a high proportion of cases marriage is contracted only if a pregnancy is started Such a course, which is biologically quite sound, does not accord with the ethical standards of all communities and therefore cannot be recommended as a general code of behaviour

7 WYNDER, A (1957) *Surgery Principles and Practice*, p 1337 London Pitman Medical
8 RAVICH, A & RAVICH, R A (1951) Prophylaxis of cancer of the prostate, penis and cervix by circumcision *N Y St J Med* 51 (1), 1519
9 VAN BEUKERING, J A (1955) A simple method of circumcision *W Afr med J* 4, 43
10 KANZLER, R W (1958) Circumcision and skin graft with prepuce Personal communication Ghana
11 LAYCOCK, H T (1950) Surgical aspects of female circumcision in Somaliland *E Afr med J* 27, 445
12 SEQUEIRA, J H (1931) Female circumcision and infibulation *Lancet*, 2, 1054
13 WORSLEY, A (1938) Infibulation and female circumcision *J Obstet Gynaec Brit Emp* 45, 686
14 SEGAL, L (1942) *English Russian Dictionary* London Lund Humphries
15 WILSON, D C (1955) Female circumcision and the age of the menarche *Brit med J* 1, 1375
16 MELLY, J M (1935) Infibulation *Lancet*, 2, 1272
17 PLOSS, H H & BARTELS, M K A (1935) *Woman* London William Heinemann
18 RIBEIRO, A L (1953) The uvula and East African negroes *E Afr med J* 30, 393

count is below normal in a subfertile male, the chances of producing a pregnancy from such semen is greatly increased by the local *intravaginal* use of the proprietary preparation Hyalase This should be placed about the uterine cervix *prior to* insemination of the female Before this discovery it had been noted in the past that the chances of a pregnancy were considerably increased if the female vagina was washed out with an alkaline solution before coitus Removal of some of the cervical mucus in this way probably contributed appreciably to the removal of the natural mucous barrier to pregnancy

Not infrequently male patients asking to have their wives investigated for infertility decline to submit specimens of semen for examination In most of these cases it is thought that the male is probably well aware of his own state of infertility, but does not wish to have it confirmed by scientific methods for fear of losing his wife Many male patients in the tropics who are partners of infertile marriages confidently affirm that they have children by another woman in a distant village As a patient cannot be forced to submit a specimen of semen for examination, much the easiest method of arriving at a diagnosis as to his fertility is to undertake an examination of the cervical mucous plug from the wife within twenty-four hours of intercourse with the man to be investigated Venn [4] suggests that the degree of fertility or subfertility can be estimated with reasonable accuracy on the basis that if there are no sperms in the mucous plug from the cervix, infertility of the male can certainly be concluded If the male is normally fertile fifty sperms or more can be found within the mucous plug during the first twenty-four hours after insemination If the number of sperms present is below fifty, subfertility can be concluded The postcoital mucous plug examination is best undertaken at about the time of the woman's expected time of ovulation if possible This time is twelve days after the first day of the last menstrual period At this time the mucus is less viscid than at other times during the cycle and spermatozoa penetrate it more easily

It is generally accepted that patients with bilateral cryptorchidism or undescended testicles on both sides are sterile Unfortunately marriages are contracted on occasions without the true significance of this abnormality being fully appreciated before marriage by either party One case of cryptorchidism has been seen where the man alleged that he had three live children The possibility that these children were by his wife with another male consort must be considered Male patients in the tropics who realise that they are sterile usually willingly accept the children of their wife born of another man The fact that the wife produces the child is in itself an adequate means of taking away his reproach of having no children, which is looked on with disfavour Children produced under these circumstances are not very unusual and are accepted very willingly by all, the identity of the true father not being made manifest If a testicle is undescended or ectopic in position spermatogenesis is usually absent or defective There is also a greater risk of malignancy developing in an abnormally placed testicle For these two reasons it is desirable if at all possible to bring down a testicle from the inguinal canal into the scrotum The use of male hormones in early adolescence and childhood is of some benefit in inducing testicular descent, but they are usually ineffective if the patient reaches the age

A fair estimate of the likelihood of fertility can be arrived at by undertaking a semen examination for male patients Adatia [2] gives the "average standards' required for human semen as

Volume of ejaculate	2 5 c c or above
Morphology	80 per cent or above normal oval forms
Motility	40 per cent active sperms or above
Sperm count	60 million per cubic centimetre of semen

O Donoghue,[3] commenting on the significance of sperm counts and the chances of pregnancy in a healthy woman, found as follows

Sperm count below 5 million per cubic centimetre—the chances of a pregnancy are bad
Sperm count between 5 and 10 million per cubic centimetre—chances of a pregnancy are low
Sperm count at level 15 million per cubic centimetre—chances fair
Sperm count at level 20 million per cubic centimetre—chances normal
Sperm count above 20 million—chances of a pregnancy are high

These figures differ considerably from those of Adatia who takes 60 million to be an average sperm content per cubic centimetre The general consensus of opinion suggests that 50 million sperms per cubic centimetre is a good healthy level and likely to ensure a pregnancy in a healthy woman of child bearing age The motility factor in spermatozoa is important in the ensuring of fertility The initial motility should not be less than 50 per cent of the sperms present After five hours exposure to the atmosphere it should not be less than 40 per cent Abnormal forms of sperms should not exceed 10 per cent in the count If abnormal forms are as high as 25 per cent subfertility is likely Considering that fertilisation of the female ovum is ultimately dependent on the interaction of one sperm and one ovum only, it would appear to be a prodigious waste of human germ cells that approximately 100 million sperms are evacuated with each intercourse It is, however, significant to note that a count of below 20 million sperms per cubic centimetre of semen gives a low chance of pregnancy

There must obviously be some very important factor present in the semen to account for fertilisation taking place only in the presence of a large number of sperms The comparatively recent discovery of the remarkable liquefying action of hyaluronidase gives the likely answer to the problem This proteolytic substance, otherwise termed Hyalase, is a biological extract of ox testicle It liquefies tissue fluids and mucus, and it appears that the factor which liquefies the normal mucous secretion within the cervical canal is derived from the testicular germ cells or spermatozoa themselves Whereas one sperm alone is the essential male element in a pregnancy, fertilisation is only possible in the presence of a large number of sperms, each contributing a subminimal quantity of liquefying factor of the nature of Hyalase, and this makes it possible for some sperms to penetrate through the upper genital apparatus to the site of the female ovum Fertilisation probably takes place in most instances within the ampulla of the Fallopian tube Considering this important mucus softening action, Moricard has suggested that when a sperm

there is usually evidence that he has had a chronic epididymitis, particularly about the lower pole of the epididymis It may be helpful in these cases to open the vas deferens by removing, very carefully, a slice of tissue from one side of the tube, thus forming an oval window-like opening in it, and anastomosing the vas to the top of the epididymis which is opened up It is wise not to cut the vas right across, for if this is done the vas will slip away more easily and the anastomosis is much less likely to hold The lateral window anastomosis is considered better than an open end anastomosis The junction should be secured by the use of very fine insoluble ligature material This operation has been undertaken on several occasions and whereas an absence of sperms was noted before the operation, a small number of sperms has been found on several occasions after the operation The number of sperms has, however, on all occasions been below that usually reckoned to be necessary for the inception of a pregnancy Under these circumstances, the chances of producing a pregnancy can be increased by the local use of Hyalase in the female as already indicated This operation is of no advantage if the patient is suffering from testicular atrophy following mumps or other disease

Many years ago operations for varicocele, particularly about the left testicle, were undertaken freely as the patients were worried about the increasing size of the left testicle and its associated structures There was also a dull sense of pain locally Operations have been less frequently undertaken for this condition in recent years, but it has been suggested by some surgeons that where a male patient is considered to be subfertile, his fertility may be somewhat increased by the removal of a mass of veins from the varicocele Sperm counts vary greatly in patients from time to time A final opinion should not be given on one examination alone, unless it is within normal limits If it is below normal, suggesting subfertility, it should be repeated four weeks later after rest, tonics and hormones

In male patients where there is a failure of erection of the penis in the absence of any known disease or psychological maladjustment regarding sex relations, Lowsley's operation of plication of the bulbocavernosus muscle beneath the perineal urethra gives reasonably good results Few workers undertake this operation sufficiently often to express an opinion of value as to its effectiveness Only a small series of these cases has been undertaken personally The results appeared to be beneficial in carefully selected cases Ma,[5] working in China, undertook a small series of these operations with satisfactory results Lowsley s results in his very large series of 199 cases are as follows

Lowsley's Operation	Successful	43 per cent
	Improved	33 per cent
	Unchanged	18 per cent
	Untraced	6 per cent

One might therefore reasonably conclude that the operation is worth undertaking and gives favourable results in probably 50 per cent of the cases

Floss nylon is considered better than floss silk, as recommended by Lowsley for this operation, as it is a less irritant type of material than silk A course of penicillin should be given following operation to decrease the risk of infection

of 15 years before they are started Hormone treatment of undescended testicles [illegible] advantage

[illegible] ho have a perineal urethral opening and who [illegible] dult life, usually have normal erections of the penis and can have sexual relations, but semen on ejaculation does not enter the vagina The chance of the woman becoming pregnant by improperly placed semen is remote It is necessary to undertake a major plastic procedure to bring the urethral orifice as far forward as possible on the penis If this can be brought to the level of the base of the glans the chance of normal insemination is good Prior to any urethral reconstruction for hypospadias, or urinary fistula from any cause, it is essential to undertake a suprapubic cystotomy for the deviation of the urinary stream as a temporary measure while a plastic procedure is healing

Infertility may be due to a defective hormone balance With decrease of sex desire there is an inadequate physiological response which is necessary to make sex relations possible A fair number of male patients in the tropics who were previously potent complain of failing libido about the age of 53 years Attention to rest, diet and general health and the judicious use of hormones may prolong sex potency, which varies greatly from one individual to another Care must be exercised in the use of hormone treatment in men over the age of 50 years as this is liable in some instances to precipitate retention of urine by causing mild prostatic congestion There is a general tendency for patients over the age of 60 years to have a slight secondary rise in sex feelings which is associated with pathological changes within the prostate If such signs are noted in patients of this age the state of the prostate should be investigated

Following fracture of the pelvis with rupture of the posterior urethra not less than 20 per cent of the cases develop a marked degree of impotence Treatment for this condition is seldom followed by very conspicuous success A nerve injury sustained at the time of the fracture may cause it Tonics containing phosphorus compounds are of some value The use of intravenous Novarsenobenzol is thought to be beneficial by those who have received it Removal of all lobes of the prostate by the suprapubic route renders the patient sterile for two reasons First, the remains of the internal sphincter muscle of the urethra is probably ineffective in preventing semen entering the bladder as it leaves the seminal vesicles and, secondly, because the action of the prostatic fluid is to activate the motility of spermatozoa The sperms before they mix with prostatic fluid are not very actively motile In the absence of a normal prostate there is no prostatic fluid present and hence insufficient sperm motility, and so sterility If there is limited fibrotic enlargement about the internal urinary meatus or a small increase in size of the middle lobe causing a disturbance of micturition in patients under the age of 55 years, removal of a small amount of tissue above the level of the verumontanum by transurethral resection should be considered In this way fertility can be preserved

The reason for an absence of sperms in semen in most male patients is the presence of chronic infective disease within the epididymis of the testicle This pathology causes an obstructive lesion about the epididymis and vas deferens If a patient is found to be suffering from azoospermia, or no sperms in the semen,

must be undertaken There are probably many minor adjustments necessary between male and female partners to ensure fertility, and these are little understood In some cases where no abnormality can be detected in the male or the female, the marriage remains sterile over a prolonged period If the partners of such a marriage separate they may both have children within a very short time with other heterosexual partners The explanation of these cases is not understood There is, no doubt, some minor maladjustment present which precludes a pregnancy It is in this type of case that hormone therapy of the male and the female meets with most success Partners of the same blood group have usually a slightly higher fertility combination than when the partners are of different blood groups

Any part of the female genital tract being diseased or abnormal can interfere with fertility These conditions will be considered in sequence relative to vaginal abnormalities, uterine pathology, tubal dysfunction and ovarian defects Malformations of the vagina have already been given some consideration These may be congenital adhesions of the lesser labia, imperforate hymen, bipartite or septate vagina and congenital atresia of the upper third of the vagina Adhesion of the lesser labia is usually opened in early childhood It is rare to find this condition continued into adult life Imperforate hymen is most frequently brought to notice about the age of 16 years when in a young woman a lower abdominal swelling develops, due to retained menstrual blood The patient gives a history of having had no menstrual periods, but there is breast development The condition is easily relieved by an appropriate incision suitably placed in the imperforate membrane

When occlusion of the upper third of the vagina exists it is desirable to examine the patient per rectum to see if any uterus can be detected If there is a uterus present one can conclude that the patient is not a male hermaphrodite with female configuration and psychological outlook In these cases an operative attempt should be made per vaginam to reach the uterine cervix which is covered by the soft tissues In most of these cases once the cervix is reached a probe can be passed into the cervical canal and body of the uterus without any difficulty Uterine prolapse into the vagina although not causing sterility is usually associated with a decrease in fertility There is in most of these cases an associated rectocele and cystocele also present If a Manchester operation—colpoperineorrhaphy with amputation of the cervix and shortening of Mackenrodt's ligaments—is

xercised in women in the child bearing
vagina unduly or below that necessary
vent of another pregnancy

Extreme degrees of vaginal occlusion, precluding a pregnancy, is on occasions produced by the effect of irritant vaginal tampons placed within the upper third of the vagina In some of these cases stricture formation occurs to such a degree that only a wire probe can be insinuated through the opening By this type of stricture formation a patient may be rendered sterile In some instances there is complete occlusion of the vagina with production of hæmatocolpos The external uterine os is sometimes completely closed by scar tissue due to tampon ulceration Cervical scarring is followed by amenorrhœa frequently, no blood accumulating within the uterine cavity In extreme cases of female circumcision of the infibulation

By tightening up the bulbocavernosus muscle the return flow of venous blood from the male external genital organs is impeded to some extent, thus helping the physiological response required in preparation for the sex act

Van Beukering and Vervoorn [6] investigating a case of infertility in a male African patient considered that filaria and schistosomiasis were probably contributory factors influencing fertility Gonorrhœal obstruction of the vas deferens and epididymis is probably the most common cause of male infertility Gonorrhœa is also a very frequent cause of female infertility It causes obstruction in narrow tubular structures—the vas deferens in the male and the Fallopian tube in the female The use of sulpha drugs and penicillin have been very beneficial in clearing up infections which involve these structures Genito-urinary tuberculosis in the male may be a cause of infertility though only a very small number of cases of this type have been noted in the tropics Tuberculous infection of the vas deferens is occasionally indicated by the beaded nature of the vas within the scrotum There is often evidence of tuberculosis of the genito-urinary tract elsewhere

The investigation of stricture of the vas deferens has been undertaken with limited success If a stricture is suspected it can sometimes be confirmed by exposing the structure and injecting saline with a fine needle in the proximal direction into the lumen of the tube If the vas is patent above this level the saline will pass along the tube in the upward direction without undue difficulty

If the vas is damaged during an operation for hernia or hydrocele it can usually be reconstructed in adults by insertion of a fine piece of monofilament nylon along its lumen and held in position by bringing it through the wall of the vas above and below The nylon is removed one week later

On a few occasions European male patients in the tropics have requested sterilisation by bilateral ligation of the vas deferens rather than asking that their wives should be sterilised This has been undertaken following written consent in cases where the pair concerned had produced unhealthy children and did not feel justified in producing any more If the vas is ligated and sectioned the two ends should be tied together, so that should the patient later wish to have the ends of the tube joined it will be easier to bring the ends together again and increase the chance of a successful anastomosis On no occasion has a male African patient been known to agree to sterilisation in the interest of his wife's health

FACTORS IN INFERTILITY OF THE FEMALE

The subject of infertility in female persons is one of considerable importance and magnitude It is necessary, in dealing with surgical patients in the tropics, to have a reasonable knowledge of the methods of approach in investigating female patients complaining of subfertility and infertility If the male partner is found to be fertile, the female partner must then be investigated In many instances on examination of a married woman who has no children, gross pathology can be detected in the lower abdomen on bimanual examination of the pelvis If the cause of the infertility is not apparent on clinical examination further investigations

If the cervical canal is unhealthy the mucous viscosity is in almost all cases abnormally high In some cases, particularly in women with dysmenorrhœa there is marked spasm of the uterine cervix The fertility rate in women with dysmenorrhœa is usually considerably below normal Dysmenorrhœa is in most cases reduced or disappears following a pregnancy There is a metal plug like fitting made for the treatment of spasmodic dysmenorrhœa It is a stainless steel bar of a slightly bulbous character which is inserted into the cavity of the uterus, with grooves in the sides to permit of drainage from the uterine cavity This fitting is worn for up to three months and the results have been good It has often been noted that women who become pregnant easily have almost a complete absence of any narrowing at the position of the normal internal uterine os Undoubtedly uterine spasm is a factor influencing fertility The use of anti spasmodic tablets such as Priscol is also a help in cases of spasmodic dysmenorrhœa

The operation of dilatation of the cervix and curettage of the uterus is one which is much abused There is little doubt that if the only pathology present *is in the nature of uterine cervical stenosis* by spasm or fibrosis this treatment may be of benefit Where there is no palpable pelvic pathology present approximately 10 per cent of the patients who have this minor operation undertaken become pregnant Such a result can be considered fair considering the minimal risk involved Green-Armytage [7] considering the explanation for the possible success of this operation, lists four possible reasons

1 The psychological effect
2 The removal of unhealthy mucous membrane from the uterine cavity
3 *Relaxation of cervical spasm*
4 The possibility of a tightly fitting dilator pushing up a column of air into the uterus and tubes and so opening up an obstructed tube, thus acting as a form of pressure insufflation to an adherent tube

Indiscriminate dilatation and curettage of the uterus without investigation, for the purposes of financial gain, should be discountenanced

centrally placed and arising in the submucous position it produces a rather uniform enlargement of the uterus It is often difficult to detect the exact cause of the swelling in some of these cases The condition gives rise to menorrhagia and some post-menstrual leucorrhœa, there are often associated painful uterine contractions If this condition is suspected but not certain the patient should be given a course of sulpha drugs and penicillin, and following this a hysterogram should be undertaken one week later *Penicillin is helpful in preventing complications*, as a low-grade chronic infection is not infrequently present The uterus should be X-rayed in the anteroposterior and lateral positions The curved nature of the uterine cavity seen in the films suggests the presence of a fibroid The cavity of a normal uterus is approximately straight in both directions

Any form of chronic endometritis reduces the chances of pregnancy The various forms of mechanical devices introduced into the uterus for the purpose

and introcision types as seen in the tropics, a state of infertility is sometimes produced due to the physical barrier of massive scar tissue precluding sex relations Extensive cicatrisation and vaginal stricture formation occurs in these cases

Vaginal infection of bacterial origin lowers the fertility rate by altering the pH of the local secretions, making the reaction unfavourable to male sperms

ır that with other structures

position of the uterus The position of the uterus is determined by the presence or absence of adequate pelvic support for the uterus by normal healthy perineal floor Uterine position may be influenced by pelvic inflammatory adhesions About 20 per cent of cases of uterine retroversion are of congenital origin Rectifying the position of the uterus by bimanual replacement and temporary pessary support may be helpful in increasing fertility If minor measures of this sort are not successful within a limited time operative procedures will have to be adopted Operative measures are seldom necessary unless the retroversion is " fixed ' by adhesions

With practice and experience uterine fibroids can in most cases be detected on bimanual examination of the pelvis Fibroids placed in the upper third of the uterus are much more likely to cause sterility than those placed in the lower part of the structure The internal ostium of the Fallopian tube being of small calibre is easily obstructed by the presence of a fibroid in the fundus of the uterus

An unhealthy uterine cervix markedly lowers the chance of a pregnancy Nabothian folliculosis, associated with low grade endocervicitis, is a very chronic *condition There is frequently a cervical erosion also present in these cases* Direct puncture of Nabothian follicular cysts by diathermy needle gives good results as by this means a new channel of entry is made into the cyst, and with drainage of the cyst pressure on the cervical canal is reduced Excellent results can also be achieved in these cases by the use of a zinc chloride saturated solution applied into the dilated cervix on a porcelain plug for twenty-four hours This form of chemical cautery is found to burn away sufficient tissue to remove unhealthy mucous membrane and open the entry to the cysts allowing them to drain via the cervical canal Within four days of the institution of this type of treatment, a mass of yellow slough can be removed from the cervix and there is a marked reduction in the bulk of the local tissue The cervix returns to an apparently normal appearance within three weeks The results are excellent Endocervical cautery by zinc chloride plugs has been found personally to be followed by a much higher rate of pregnancy than where diathermy cautery of the cervix is used This chemical method is very practical in country stations where diathermy apparatus is not often available If the specially prepared plug made for this purpose is not available, cylindrical wooden plugs 1 in long of lead pencil calibre are suitable for this purpose and can conveniently be used A small hole is bored through one end of the plug through which a light string is passed so that with this string loop the plug can easily be removed after twenty four hours The plugs should be soaked in the solution for twelve hours before use and then the excess dried off with a swab before insertion A dry gauze swab should be placed over the plugged cervix to prevent the zinc chloride burning the vagina

tubes Intra-uterine lipiodol with permeation of the tubes followed by X rays is also a valuable method of investigation, indicating the position of tubal obstruction when this is present The risk of complications following air inflation of the tubes is low but cases have been seen where death has occurred following this procedure due to air embolism, this was confirmed by post-mortem examination This form of examination is therefore better undertaken in hospital than as an out-patient procedure Adequate preparation before tube testing is essential and serious pelvic sepsis may result if adequate aseptic precautions are not undertaken Air inflation of the tubes should not be undertaken following uterine dilatation and curettage because of the considerable risk of air embolism The minimum trauma of the cervix should be aimed at in applying any form of air inflation apparatus The use of the "screw in" type of cannula for the injection of air or lipiodol is less traumatising than when the cervix is gripped and held by a volsellum forceps Some authorities fill the upper vagina with fluid when an air inflation test is being undertaken, by this means a leak back of air is more easily noted Errors in interpretation of the test are thus decreased

If the Fallopian tubes are widely open the air should enter the abdomen at a pressure not above 60 mm of mercury pressure If the tubes are congested but not completely obstructed the air enters the abdomen at a pressure of up to 90 mm mercury If carbon dioxide is used from a cylinder to test the tubes and a writing manometer arm is used on a chart to indicate the pressure registered, it will be found that as the pressure is raised intermittently, the pressure rises momentarily up to 160 mm mercury where the tubes are completely obstructed on both sides The tubes may be obstructed at any position—the inner end, the outer end, or along their course Obstruction occurs most commonly at the isthmus position in cases of "one child" sterility where there is usually a low-grade infection following childbirth Catarrhal congestion throughout the length of the tube occurs with gonorrhœal infections In some of the cases there is seropus formation within the tube In tuberculous conditions of the tubes all layers are involved and the lumen becomes obstructed

Any low-grade infection within the pelvis is liable to cause adhesions of the peritoneum and so obstruction to the fimbriated end of the tubes Whereas gonorrhœa is probably the most common cause of fimbrial adhesions, tubal obstruction is sometimes the result of an appendix abscess In the tropics amœbic dysentery also is a potent cause of pelvic adhesions secondary to the chronic congested state of the rectum The sigmoid colon and rectum, as seen from within the peritoneal cavity at operation in cases of amœbic dysentery, show an unhealthy œdematous appearance with a patchy distribution Multiple small filmy adhesions are usually present It is considered that amœbic dysentery should be listed amongst the possible causes of sterility in women in the tropics If a Fallopian tube is abnormal due to chronic inflammation it is improved to a very considerable extent by the use of sulpha drugs and antibiotics, penicillin and chloromycetin being the most beneficial for this purpose Many women suffering from prolonged sterility have been known to become pregnant soon after drug treatment of this type Presumably a low-grade chronic inflammatory condition of the upper genital tract was improved by the treatment

of permanent contraception work on the principle that their presence produces a low-grade endometritis and this prevents the normal embedding of a fertilised ovum Metal "wishbone" contraceptives and Graffenburg rings are of this variety In cases of sterility, particularly in European women resident in the tropics where there is a history that "something was done" some years earlier to prevent children coming, an X-ray of the pelvis is very useful in showing up this form of opaque metal foreign body in the uterus The patient has very seldom got a precise knowledge of what was done nor appreciates that there is such a form of contraceptive in position There is a special small atraumatic hook made for the removal of Graffenburg rings About 20 per cent of all women who have not borne children produce fibroids of the uterus in later life Fibroids are slowly progressive, but often take years to develop sufficient size to be easily palpable through the abdominal wall Myomectomy is indicated if fibroids produce menorrhagia in women under the age of 40 years In women in the tropics over the age of 40 who have had children, it is advisable to undertake a total or subtotal hysterectomy If a woman in the tropics has had no children but has not yet reached the menopause the fibroid may frequently be left alone without undue danger until after the menopause The majority of women in the tropics who have not reached the menopause resent hysterectomy very much and attribute all manner of ills to the absence of menstruation Much greater reserve is therefore necessary in considering removal of the uterus in women in the tropics than in women in non-tropical countries

Pathology within the Fallopian tubes accounts for the highest percentage of cases of sterility of any single condition Salpingitis is often due to the gonococcus, coliform bacilli, tubercle bacilli or other bacterial infections less frequently account for the condition It should not be forgotten that in the tropics the Fallopian tubes are frequently infected with schistosomiasis This occurs in approximately 12 per cent of women with *Schistosoma hæmatobium* It has been noted personally where a chronic inflammatory appendix has been removed and found to contain schistosome ova that the uterus and tubes usually show a remarkably patchy appearance of a yellowish-red blotchy type The reddish parts are not uniformly distributed over the serous surfaces The uterus in *S hæmatobium* cases is found to contain ova in about 79 per cent of the cases This may well account for chronic metritis and cervicitis It is understandable how this disease often produces a subfertile state Women in the tropics being investigated for sterility should certainly have the urine examined for schistosome ova if the disease is encountered in the district Schistosome ova are also occasionally found in uterine curettings

Chatterji[8] considered filariasis was a likely cause of some cases of sterility and dysmenorrhœa, due to involvement of the tubes No cases of this type have been personally recognised and filarial enlargement of groin glands is certainly much less common in women than in men Where chronic intrapelvic filarial glands do occur in women, the possibility that low-grade chronic congestion of the Fallopian tubes interferes with fertility is highly probable

Fallopian tube testing by air insufflation or with carbon dioxide gas is one of the most helpful methods of determining the patency or otherwise of the

pregnant subsequently It is a little difficult to understand how the ovum can get into the uterus without the physiological action of cilia in the tube but it is obviously possible for it to do so Two pregnancies following operations of this type on eight patients gives a 25 per cent success rate This is not without considerable significance This is a procedure which can be used when both tubes are totally spoiled

Upadhyay [9] also refers to the insertion of plastic tubes following loss of both tubes by ectopic pregnancies In one personal case where a plastic tube was inserted it was brought back three years later having been passed per vaginam with a menstrual period The patient wanted it reinserted She had not become pregnant through it The plastic tube was of 2 mm calibre size This size of tube can be inserted very easily and with minimal trauma through a trocar and cannula, as is used for the tapping of male hydroceles When it is inserted by this method the thickness of the uterine wall is estimated before measuring off a suitable length of tubing from a sterilised piece already available The tube is held in position by an insoluble stitch placed through its wall at the position of the serous covering of *the uterus It cannot be stitched below as the uterus is opened by the trocar* and cannula only It is not usually difficult to feel when the trocar has entered the uterus and the fact that it is in the uterus can be confirmed by blowing air through the cannula after the removal of the trocar, using a 10 c c syringe Saline also can be used and if it goes in easily there is little doubt that the end of the tube is in the cavity of the uterus If the patient is horizontal on the operating table saline may pass out through the vagina The tube, being flexible but reasonably rigid, remains patent and is not closed by the pressure of the uterine walls

If a pregnancy does not occur within a few years following the insertion of a plastic tube or a reimplantation of the outer two thirds of the patient s own tube, one is not likely to occur As a last resort the possible *implantation of an ovary* into the uterine cavity direct may be considered Preston [10] reports a most interesting series of such cases He undertook twenty one cases after this fashion Eleven of the cases were untraced following operation leaving a remainder of ten cases which were observed with the following results

Three *pregnancies occurred in the ten cases observed*
One of the patients aborted
Two women produced live children at term
One patient delivered normally
One patient was delivered by Cæsarean section

Two women producing live babies out of ten noted, gives a success rate of not less than 20 per cent which is a remarkable achievement in patients whose reproductive system would, by most, be classed as irreparably damaged and beyond remedy The results may have been even better as over 50 *per cent* of the patients were not traced after leaving hospital Tracing of cases in the tropics following operation is most difficult This procedure should be kept in mind and given consideration where less drastic methods are not feasible *Realising* the depression caused in an African woman not having children and knowing that

Those patients with damaged cilia in the lining of the tubes are very likely to produce an ectopic pregnancy, as although they become pregnant the early pregnancy has difficulty entering the uterus The matter frequently arises as to how to treat a woman who is sterile due to obstructed Fallopian tubes, as indicated by lipiodol X-ray examination or air inflation tests On opening the abdomen the woman is in many instances found to have bilateral hydrosalpinx This is due to closure of the fimbriated end of the tubes on both sides Salpingostomy or opening the fimbriated end of the tubes and undertaking a plastic reconstruction to decrease the risk of further closure is followed by a pregnancy in only a small proportion of the cases, possibly 10 per cent Such a result must be considered poor

Jonathan Hunter noted that, following salpingostomy, if a pregnancy did not occur within the next three months it was most unlikely to occur later Presumably the tube end closes rather easily again Following salpingostomy, air should be blown back through the tube in the retrograde direction by applying a 10 c c syringe to the outer end of the tube and holding the ostium closely round the nozzle When air is blown through a characteristic sound is produced as air enters the uterus If the isthmus of the tube is obstructed in addition, air will not enter the uterus

The results of treatment of tubal obstruction are most favourable if the obstruction is at the inner end only It is possible in these cases to remove the inner third of the tube and reinsert the residual outer two-thirds through a new opening into the uterine cavity The results are reasonably good with about a 50 per cent success rate in producing a pregnancy subsequent to the operation After section of the tube at the surface of the uterus position, the inner obstructed third is removed leaving the outer two-thirds which can be shown to be open by a probe being passed through it with ease A cylindrical portion of the uterine wall is then removed in the tube position by the use of an 8 mm Silcock's punch This instrument was originally made for the removal of warts, but it is very convenient for the operation of tubal reimplantation It is a cylinder with a sharp cutting end and it bores out a solid piece of uterine wall in the position required The opening made accommodates the remaining part of the Fallopian tube admirably The tube is held in position, after splitting open the end, by two No 0 chromic gut ligatures The operation should be undertaken at the mid stage of the menstrual cycle as at this time there is least uterine congestion present In view of the possibility of reimplantation of the outer two thirds of the tube into the uterus considerable conservatism should be exercised in dealing with cases of ruptured ectopic pregnancy which are found in the inner third of the tube Whereas the outer two thirds of the tube cannot be implanted at the time of the operation for the ruptured ectopic pregnancy, because of congestion of local structures which would make it unsafe, it may be undertaken at a later date This is particularly important in women who have already lost the other tube from a previous ruptured ectopic pregnancy

In cases where both tubes are irreparably damaged throughout their entire length, the possibility of insertion of a plastic tube through the uterine wall in the normal tube position should be considered This operation has been undertaken personally on eight occasions and two of the patients are known to have become

infantile uterus which opened into the posterior urethra in the position of the uterus masculinis

Sterile women come to hospital from time to time in a state of great elation and excitement under the impression that they are at last pregnant, as they have missed one or two periods and notice breast enlargement Such changes may be produced by taking female hormones by mouth in large doses and it is worth asking such patients if they have been having any such form of treatment. Appreciating this action of female hormone tablets, their use has been employed by unskilled persons in Africa who profess to give treatment for sterility This temporary apparent success brings great credit to the person giving the medicine and gives rise to high hopes in the patient only to be followed by great disappointment If hormone tablets are given in the hope of improving fertility this disturbance of menstrual cycle should be indicated to the patient, otherwise unjustifiable hopes will be raised only to be followed by despondency

REFERENCES

1 GREEN-ARMYTAGE, V B (1928) *Tropical Gynæcology*, p 62 Calcutta and Simla Thacker Spink
2 ADATIA, M D (1954) The male factor in human sterility *Indian J med Sci* 8, 385
3 O DONOGHUE, P D (1956) Sterility in the male *E Afr med J* 33 395
4 VENN, D (1957) *The evaluation and treatment of male infertility* *Cent Afr J Med* 3, 171
5 MA, J Y C (1949) Lowsley's plastic operation for the cure of certain types of sexual impotence—with two case reports *Chin med J* 67, 143
6 VAN BEUKERING, J A & VERVOORN, J D (1956) Sterility in an African *Docum Med geog trop (Amst)* 8, 61
7 GREEN ARMYTAGE, V B (1928) *Tropical Gynæcology*, p 81 Calcutta and Simla Thacker Spink
8 CHATTERJI, K K (1927) *Tropical Surgery and Pathology in the Tropics* London Bale Sons & Danielsson
9 UPADHYAY, S N (1955) Ectopic pregnancy *J Obstet Gynaec India* 6, 76
10 PRESTON, P G (1953) Transplantation of the ovary into the uterine cavity for treatment of sterility in women *E Afr med J* 30, 519
11 VERNON, H K (1958) Two cases of hæmaturia in male pseudohermaphrodites Personal communication

she has no hope of having children, this procedure holds out some hope The method is not devoid of danger in view of the trauma to the uterus and the possibility of subsequent rupture during labour Cæsarean section might reasonably be considered if a woman is fortunate enough to conceive a child in this way It would be a great loss to lose the child so produced by the stress of labour If following this type of operation a pregnancy occurs but the woman subsequently aborts, the danger of curetting the uterus must be realised Most abortions ultimately clear up with slow evacuation of the products of conception, and natural evacuation should be relied upon if at all possible If bleeding continues the cervix might be dilated and the cavity of the uterus washed out, but the use of a sharp curette should be avoided Gentle manipulation of the uterine contents with a blunt flushing curette might be undertaken without undue damage to the implanted ovary

In a small number of cases failure of ovulation accounts for sterility Ovulation normally occurs on the twelfth day after the onset of the last period The ovum remains alive until the seventeenth day of the cycle, after which time it dies The remaining eleven days of the cycle are sterile Whereas this is a good generalisation, variations may occur and ovulation at two different times in the menstrual cycle has been suggested The exact day of ovulation can usually be discerned if the woman takes her morning temperature each day before rising from bed On the day of ovulation a subnormal temperature of 96 5° F is registered, this is followed within twelve hours by a temperature which is about 1° F above normal resting temperature of 97 F—that is, 98° F The pre-ovulation morning temperature is usually about 97 2 F while the post-ovulation morning *temperature is usually 98 2° F Inception of a pregnancy is most likely to occur* between the twelfth and the seventeenth day of the cycle

Failure of ovulation is in some instances due to sclerocystic disease of the ovary This is the result of a low-grade infection within the pelvis in most cases Fibrosis of the surface of the ovary in this way is not uncommonly followed by the slow formation of an ovarian cyst In some cases there is a gross tubo-ovarian inflammatory mass developed Anovulation is thus produced, secondary to infective disease If a tubo-ovarian mass develops, it is often possible to remove it complete without rupture and without necessarily removing the ovary entirely If at all possible ovarian tissue should be left within the pelvis for the sake of the hormone it produces If all ovarian tissue is removed indiscriminately in cases of bilateral tubo-ovarian masses, the woman will certainly suffer from permanent amenorrhœa, which causes her great distress In women suffering from sterility an effort should be made to determine the reason for abdominal operation scars They may be due to an operation for a previous ruptured ectopic pregnancy or an earlier tubo-ovarian abscess mass

The possibility that a patient complaining of sterility may be a male pseudo-hermaphrodite should be kept in mind Such patients have been seen on a few occasions and they are quite unaware of the peculiar nature of their abnormality Almost all male pseudohermaphrodites although appearing like females and with feminine psychology and bodily configuration suffer from permanent amenorrhœa Vernon [11] noted two cases in which blood was passed with urine coming from an

menstruating at the age of 3 years Where menstruation starts in young female children there is sometimes an ovarian tumour of some sort present to account for it In one such case seen personally in 1946 at Accra, on the Gold Coast, where a female child started to menstruate regularly at the age of 2 years, it was found at operation that the infant had an ovarian tumour present

Abnormally early pregnancy is not so uncommon as is generally believed It is more common in tropical countries than in temperate areas of the world A marked lowering of the age of first pregnancies has been noted in England in recent years Pregnancy beyond the age of 46 is rare In North Africa in 1954 one woman was reported to have become pregnant and been delivered of a full term child at the age of 51 years, five years after she had ceased to menstruate Pregnancy following the cessation of menstruation at the menopause is less common than pregnancy before the onset of menstruation at puberty One of the cardinal signs of pregnancy in a woman of the child bearing age is the occurrence of amenorrhœa It should be remembered that in rare cases a woman may become pregnant and have some periodic bleeding during the first three or four months of pregnancy This does not necessarily appear to be synonymous with threatened abortion Such an occurrence is undoubtedly rare, but in a case personally encountered in a young Syrian woman whose fertility was very high, this occurred with each pregnancy She had six children at the age of 25 years and reported that with all her pregnancies she had regular, though small, menstrual bleeding during the first five months of gestation The explanation of this is not certain One would suspect that there would be a cessation of menstruation with the altered hormone balance of pregnancy This woman had never lost any of her pregnancies, all went to full term It is not infrequently noted by a woman who becomes pregnant that the last period seen was of short duration—two days with slight loss of blood only If a young woman complains of amenorrhœa, but has no other evidence of pregnancy present, the possibility of the amenorrhœa being due to illness and not a pregnancy must be considered It was not very unusual, when pulmonary tuberculosis was very common in Ireland, to note amenorrhœa as the first indication of the disease in young women With the rapid decrease in tuberculosis in northern countries in recent years this is now seldom noted In the tropics, where tuberculosis is in some areas frequently seen and still increasing, amenorrhœa due to tuberculosis may require consideration

The signs of pregnancy are dependent almost exclusively on the presence and action of special hormones developed with the pregnancy present In looking for signs of pregnancy one is really looking for signs of the biological effects of pregnancy hormones in the patient The responses noted are amenorrhœa, enlargement of breasts, pelvic congestive changes, uterine enlargement and physiological disturbances seen in vomiting and frequency of micturition The biological changes caused by pregnancy hormones have been employed for the early diagnosis of pregnancy These hormones are excreted in the urine and it is possible by injecting the urine of pregnant patients into small laboratory animals and amphibians to elicit pregnancy reactions in them which are easily and quickly detectable Various small animals and amphibians have been used for this

14

Surgery in Pregnancy

CONFIRMATION OF PREGNANCY

THIS chapter title has been chosen to cover a subject which is of great importance and a matter of considerable concern, not only to specialists, but to all doctors who are obliged to undertake the many branches of medicine and surgery met with in isolated places in the tropics The standard descriptions of antenatal work can be found in the books devoted exclusively to obstetrics In this book the matter is treated with particular reference to pregnancy as being a factor complicating general surgery Such an approach essentially deals less strictly with cases of normal uncomplicated pregnancy than with cases which give rise to difficulty in diagnosis or which are seen as complications of surgical conditions The diagnosis of pregnancy is seldom difficult between the third month of pregnancy and full term Pregnancy is rare under the age of 15 years and after 46 years If conception occurs outside these age limits the diagnosis of pregnancy may be difficult to conclude with certainty In exceptional cases pregnancy may occur much below or slightly above these age limits Several authentic records have been traced of pregnancy in children varying between the ages of 5 and 12 years at the time of delivery An extract for reference is included as a matter of interest

It should be remembered that pregnancy may be a rare cause of lower abdominal swelling in female children much below the normal child-bearing age The youngest pregnancy case personally observed was aged 12 years In this case there was difficulty in diagnosis, as the fœtus was dead and X-ray of the lower abdomen did not show any visible shadow suggestive of fœtal bones On opening the abdomen, sarcoma of the uterus was considered as a possible diagnosis In view of the seriousness of a young child losing the uterus and the uncertainty of the diagnosis, it was decided to undertake a preliminary hysterotomy and on so doing the pregnancy was discovered The fœtus and placenta were removed by Cæsarean section and the uterus closed The pregnancy was of about seven months' gestation, but was probably dead for some considerable time, thus accounting for the lack of obvious calcification of the bones on X-ray examination Asirifi[1] reports the comparative frequency of full-term pregnancy in young girls in Togoland, whose ages do not exceed 12 years, he having dealt with four such cases by Cæsarean section within one year Section was undertaken in each case following trial labour because of the small size and the early age of the mothers In none of these cases had the patient started menstrual periods before the occurrence of the pregnancy In the case of the young mother who was delivered by Cæsarean section in Lima in 1935, at the age of 5 years, the child started

the number of units of Antuitrin required is calculated One unit of Antuitrin per gram of frog weight will usually produce a good sperm reaction if the frog is of a suitable type Tien, Chen and Hua [13] found that it required 30 international gonadotropin units to induce a good sperm reaction in male toads in springtime in Shanghai

Fluid can be removed from the cloaca of the frog for detection of spermatozoa or more conveniently be obtained by putting the frog into a clean dry container with a non-absorbent floor and when urine is evacuated it can be tested for sperms at four hours and again at twelve hours if the first test is negative If the frogs or toads are found to be suitable they will not be injured by a sterile injection and can be kept for further tests at a later time If it is confirmed that a certain type of local frog is suitable for the test further control tests are not required

Biological pregnancy tests are very useful in cases of suspected *ectopic pregnancy* which are unruptured, where the diagnosis is often more difficult than when the pregnancy has ruptured *The frog tests become positive within three weeks of* conception, this may be at a time only a few days beyond the normal expected *time of menstruation The amount of suspect pregnancy urine to be injected* into the individual frog is an important factor The amount recommended is 1 c c per 10 gm of frog weight Frog weights may be roughly 10, 20, 30 or 40 gm and these frogs would require 1, 2, 3 or 4 c c injection of the urine to be tested

In examining young unmarried girls for possible pregnancy, the history is notoriously unreliable and little weight should be placed on the history given regarding menstruation In all cases of possible pregnancy the breasts should be examined for secretion, if the mouth does not speak the truth, the breast does Women frequently come to surgical clinics and antenatal departments in the large towns requesting examination for pregnancy because of amenorrhœa It should be remembered that amenorrhœa may be due to voluntary ingestion of ovarian hormones by mouth Such tablets are frequently taken by patients in towns where they can be purchased or obtained without medical supervision This form of amenorrhœa is seldom seen in country districts With artificial sex hormones taken by mouth there is often amenorrhœa, breast enlargement and uterine enlargement, in spite of no pregnancy being present and there is an obvious and natural tendency to diagnose a pregrancy It is advisable under these circumstances to ask the patient if she has been taking any tablets to improve her chances of pregnancy Many patients given stilbœstrol who have a menstrual period suppressed by the drug believe they have been pregnant and had an early abortion when the next period comes

Many patients in the tropics cannot give the date of the last menstrual period It is sometimes difficult to know how many months a woman is pregnant *Considering the constancy with which the fœtal movements are first felt at twenty* weeks' gestation, it is very useful in estimating the expected time of delivery to use this date as a *time of reckoning It is very difficult to hear any heart sounds* before the fifth or sixth month of pregnancy It is personally considered much better to listen *for fœtal heart sounds using the ear directly on the woman's* abdomen than through a binaural stethoscope It should be kept in mind when constructing new hospitals or *putting in new electricity* supplies from private

purpose, the most commonly employed being the mouse, the rabbit, the frog and the toad The frog and the toad are different species of the same genus of amphibians Frogs belong to the species Rana and toads to the species Bufo Either can be used for the tests, but the results are slightly more accurate when toads are used

Biological pregnancy tests are unnecessary in most antenatal patients and these patients are usually satisfied with a clinical diagnosis of pregnancy which if in the early stage is only presumptive, is within one month usually beyond dispute In some instances it may be necessary to confirm or refute the presence of a pregnancy by the use of a biological pregnancy test Pure chemical tests for pregnancy have been devised for the detection of pregnancy hormones such as Beard's[2] antrone test and Richardson's[3] colour test on urine, but they appear less reliable than biological tests and are not frequently used The Voge[4] test for pregnancy is a colour reaction for histidine excretion The prostigmin pregnancy test was introduced by Hechter,[5] who noted that menstrual bleeding could be induced in non-pregnant women who suffer from amenorrhœa due to causes other than pregnancy, but that menstrual bleeding did not occur when prostigmin injection was given in cases where the amenorrhœa was due to pregnancy In undertaking the Zondek Aschheim test young female mice of about 8 weeks old are used, being of 6 to 8 gm in weight

Normal pregnancy urine gives anything up to 140 international units of gonadotropin per cubic centimetre If the urine contains 20 units of gonadotropin per cubic centimetre the mouse test is positive in 90 per cent of cases A comparison is given in the extract appended (T'ien Shueh-P'ing, *et al*[6]) indicating the relative value of the male toad, the male frog and female mice in pregnancy testing The male toad is considered to be the most accurate by these workers, 99 per cent positive, as opposed to the male frog which gave positive results in 83 3 per cent of the trials where 20 international units of commercial gonadotropin was injected Wahi and Navani[7] considered the Zondek-Aschheim test the most reliable, but they admit that frog and toad tests are very good and cheaper and more convenient to use A positive pregnancy test is indicated in young female mice by congestion and blood cyst formation in the ovaries within twenty-four hours of injection

Ovulation in female frogs was noted in the original frog tests of Hogben on injecting them with pregnancy urine Later it became obvious that a quicker and more reliable reaction could be induced by the injection of pregnancy urine into male frogs This method induced an emission of sperms into the cloaca within four hours of the injection of pregnancy urine into the dorsal lymph space If sperm emission does not occur within four hours of the injection of the urine under test for pregnancy, a second examination of the injected frog is made at twelve hours, if no sperms are then found the test is considered to be negative

The question is frequently asked Are the local frogs any good for pregnancy tests? Much the easiest way to find out is, as suggested by Khaleque[8] working in India, to take local male frogs or toads which vary in weight from 10 to 40 gm approximately and give them 1 unit of proprietary Antuitrin "S" (Parke Davis) per gram of weight Prolan (Bayer) can also be used If the frog is weighed

fœtal parts is the most valuable single examination in such cases Fœtal parts behind the position of the anterior surface of the lumbar vertebræ as seen in the lateral X-ray picture is a most valuable sign indicating the nature and site of the pregnancy The value of rectal examination in unusual pregnancy cases should be realised as the body and the fundus of the uterus can often be felt in this way It is little enlarged and the abdominal mass is easily detectable as being above and separate from the uterus

Infra-red photography has been tried in dark-skinned women to see if enlargement of breast veins can be detected early by this means, but the method is less useful than in light-skinned women Vomiting in pregnancy must be carefully differentiated from vomiting due to other causes during pregnancy such as appendicitis Pregnancy vomiting, more common in the morning than the evening, is not associated with localised pain in the abdomen There is a marked difference in the extent to which different women vomit during early pregnancy This is quite apart from the vomiting associated with hyperemesis gravidarum It has been noted that where there is a complete absence of morning sickness or vomiting the husband and the wife are almost invariably of the same blood group Where the blood group of both the husband and the wife is OO vomiting of pregnancy is usually absent or minimal There are no doubt many subminimal differences even in the members of the same major blood groups which may account for this

Pseudocyesis cases are seen from time to time at general surgical clinics where a non-pregnant woman presents with what looks extremely like a seven months' pregnancy The abdominal swelling is presumably caused by the forcible depression of all the abdominal contents towards the lower abdomen, the diaphragm being in a state of permanent forcible contraction This descent of the contents of the upper abdomen causes a marked protrusion of the anterior abdominal wall by the depressed abdominal contents Respiration is then maintained by intercostal respiration only The woman continues to breathe conspicuously, though with shallow respiration, in spite of the intra abdominal pressure The continued maintenance of this high intra-dominal tension is very misleading if it is not appreciated that the diaphragm is not essential for the maintenance of sufficient respiration for physiological requirements at a basic level In the cases of pseudocyesis or " false pregnancy " seen the most suggestive sign of the condition was the high tension of the epigastric musculature above the expected position of a pregnant uterus In all cases noted the woman had either had no child or had not had a child for many years The condition is most common about the time of the menopause and therefore there is often an absence of menstruation which is further misleading The condition is undoubtedly a psychological disturbance in a woman anxious to have a child No fœtal heart sounds can be heard and no fœtal bones are detected on X-ray examination In spite of the false pregnancy the woman constantly maintains that she can feel fœtal movements If fœtal movements cannot be felt in a woman with a normal pregnancy of more than six months' duration they can usually be induced by getting the woman to hold her breath for more than half a minute The mild degree of anoxygenation induced seems to precipitate fœtal movements without

diesel engines that these noisy engines should [illegible]
less than 600 yds from t[illegible]
hearts properly or conduc[illegible]
great distress to patients suffering from severe headaches due to malaria and other maladies These points are very important and should not be overlooked in the interest of the patients

Bimanual pelvic palpation is one of the most valuable forms of examination in diagnosing pregnancy If the uterine arteries can be felt easily it can be concluded that there is a marked increased uterine blood supply This may occur in inflammatory conditions of the uterus or tubes or be due to a pregnancy, intra-uterine or extra-uterine If the pregnancy is in the uterus pulsations of the uterine arteries are equal on both sides If there is an unruptured pregnancy there is usually marked increase in pulsation in the uterine arteries on the side of the unruptured pregnancy If an ectopic pregnancy has ruptured it will usually be found that the uterine artery pulsation is either absent or much less apparent on the side of the ruptured ectopic pregnancy than on the other side Possibly the artery on the side of the ruptured ectopic pregnancy goes into a state of spasm when the rupture occurs in order to arrest the hæmorrhage Diagnosing the side on which an ectopic pregnancy exists is not usually of serious import as the operative approach is either through the middle line by a vertical or a transverse incision, either side being dealt with as required

A midline lower abdominal swelling is sometimes seen in an adolescent girl with breast development, but who has not had any menstrual period due to an imperforate hymen, it is associated with a hæmatocolpos This requires appropriate treatment for drainage per vaginam A full urinary bladder seldom gives rise to difficulty in diagnosis but the accuracy of diagnosis of pelvic disease generally is much higher if the bladder is emptied as a routine before examination In rare instances a female patient may have a urethral stricture present and in spite of efforts to empty the bladder it still remains distended

X-ray examination is most useful in the diagnosis of pregnancy after the fifth month It is advisable when X-raying the abdomen for pregnancy to undertake an anteroposterior and lateral X-ray photograph, as frequently one view shows the fœtal bones much more conspicuously than the other The value of a lateral X-ray, particularly in ectopic pregnancy, has already been stressed In normal intra-uterine pregnancy the total fœtal shadow should be seen, in the lateral X-ray photograph, to be anterior to the bodies of the vertebræ Cases are sometimes referred to surgical clinics in the tropics for the removal of a supposed large uterine fibroid, where the woman gives the history that she is pregnant for a prolonged time, far exceeding the normal period of gestation (284 days) The peculiar history can be elicited that she had amenorrhœa for nine months and the abdomen enlarged as with a normal pregnancy, fœtal movements previously felt then ceased and menstruation again restarted If this history is elicited, it should not be lightly disregarded and these cases, which are not very uncommon in the tropics, are usually found to be full-term extra-uterine pregnancies The fœtus dies and with the recession of pregnancy hormones there is a re-establishment of menstruation A lateral X-ray examination of the abdomen for the presence and position of

abortion with a high temperature require careful consideration to ascertain the cause of the pyrexia In view of the frequency of instrumental abortion, and the dangers associated with it, further immediate instrumental evacuation of the uterine contents should not be lightly undertaken Many criminal abortions are sent to hospital for further treatment following initial interference with the pregnancy by an unskilled person The patient is usually given explicit instructions not to mention the treatment already received It is most important to observe if there is any evidence of prior use of instruments as indicated by pressure marks about the vagina or the uterine cervix It should not be concluded that because a woman bleeds from the uterus for a few days following early pregnancy that an abortion is inevitable

In one patient treated for threatened abortion there was a marked loss of blood for two weeks following two months' amenorrhœa, the uterine cervix was quite widely dilated, but the patient rigidly declined evacuation of the uterine contents as for an inevitable abortion In spite of the hæmoglobin level falling from 75 to 50 per cent this pregnancy went to term and the baby was delivered normally It is difficult at times to decide when a threatened abortion becomes an inevitable abortion If the uterine cervix is sufficiently widely open to admit the distal phalanx of the index finger there is little doubt that an abortion is inevitable In most of these cases the fœtus has already left the uterus before the patient has arrived at hospital If a piece of placental tissue is felt in the cervix an abortion is certainly inevitable The placenta cannot normally be felt in the uterine cervical canal unless it leaves its site of attachment

There is an increasing opinion amongst gynæcologists that spontaneous abortion may be the normal provision of nature for the termination of a pregnancy in which the fœtus is abnormal and dies Death of the fœtus in fact precipitates the abortion In cases of repeated spontaneous abortion it is advisable to investigate the patient to see if her blood is of the Rhesus-negative type With negative Rhesus female patients repeated loss of pregnancy is liable to occur Each successive loss is at an earlier stage of the pregnancy than the preceding one If there is no evidence of a Rhesus-negative factor being present, it may be desirable to undertake minor surgical procedures on the uterine cervix with a view to reconstituting the normality of the internal and the external os, either of which may be severely damaged by a previous pregnancy If the uterine cervix is unhealthy due to chronic inflammatory disease, it can be greatly improved by diathermy or the introduction of a zinc chloride plug cautery This technique decreases the risk of further abortions in cases of chronic endocervicitis Probably 20 per cent of all abortions are criminal in type One thousand criminal abortions per million total population is considered a likely estimate of the extent to which criminal abortion is carried on in many tropical countries It is therefore necessary to exercise great caution in all cases of abortion where serious complications already exist before institutional treatment in hospital It is strongly advised that in all cases where inevitable abortion exists, and evacuation of the uterus is desirable, that the patient's temperature should first be controlled by sulpha and antibiotic drugs before operation is undertaken In all cases of abortion the patient should be examined per rectum before further treatment is given to see

being dangerous If the condition of pseudocyesis is suspected and no X-ray apparatus is available for radiography, it is advised that the patient is given a light pentothal intravenous anæsthetic, while oxygen is given through a mask over the face to ensure an adequate oxygen supply The disturbance of respiration may make the administration of an intravenous anæsthetic less safe than usual unless additional oxygen is given as a safeguard Under anæsthesia the abdomen returns to normal, confirming the nature of the abnormality

In areas of the world where vesicovaginal fistula is frequently seen, it is not uncommon to note that these patients again become pregnant in spite of the presence of total urinary incontinence

Though it is seldom mentioned as a sign of early pregnancy, it is conspicuous that where young women become pregnant in circumstances which cause a mental conflict of any sort there is usually a marked lack of attention to detail in their work This is commonly noted amongst nurses and female office workers

Legal disputes on occasions arise regarding the presence or otherwise of a pregnancy It is not incumbent on a doctor to divulge confidential information to the police on such a matter Only if a case goes to court and a charge is made against any individual is a doctor obliged to give confidential information as an expert witness Information should not be given before court proceedings take place

INTERRUPTION OF THE COURSE OF PREGNANCY

In many tropical countries there is a great loss of life due to the inadequate facilities for the care of pregnant women The position is improving with the increase of maternity services Only in the large towns is there specialisation of obstetrical services under adequate supervision It is not yet possible because of the shortage of medical staff to give medical aid to all pregnant women at the time of delivery The doctor, in many instances with limited facilities, has to deal with all the abnormalities and various forms of interruption of pregnancy

As fertilisation of the mature female ovum normally takes place in most instances in the outer third of the Fallopian tube, it is necessary for the zygote or primitive embryo to traverse the length of the tube to reach the uterus before becoming embedded in the normal site of maturation The various aspects of ectopic pregnancy are sufficiently important to warrant their description in a separate chapter The embryo having reached the uterine cavity develops to maturity in possibly 80 per cent of cases The remaining 20 per cent fail to go to full term Skill and judgment are necessary to assess accurately the nature of the condition present and the manner of treatment most suitable for each individual case The type of treatment required depends on the stage of pregnancy reached and the nature of the pathology associated with it Early abortion is frequently due to failure of adequate embedding of the embryo in the uterine endometrium This is due to unhealthy endometrium or an inadequate balance of hormones In the absence of uterine infection or constitutional disease precipitating abortion, a patient seldom has a rise of temperature beyond 99 F Patients suffering from

Acosta-Sison's series (Philippine Islands)

One chorion carcinoma for every 9 4 mole pregnancies
One chorion carcinoma for every 474 abortions
One chorion carcinoma for every 4,563 pregnancies

Acosta-Sison [11] reported eleven cases of this condition and noted eleven *deaths*, 100 per cent mortality rate was considered to be due to late presentation of the cases for treatment This emphasises the necessity of not less than two examinations being made during the next four months of all patients who have had an abortion Many doctors who have had limited experience of obstetrics may not have seen cases of abnormality of the placenta following loss of the fœtus There are three grades of placental abnormality which may be seen

1 Carneous mole where the placenta remains alive in the uterus following loss of the fœtus No cyst formation or malignant change occurs
2 Hydatidiform mole the placenta becomes cystic in its chorionic villi This is a premalignant state
3 Chorion epithelioma a malignant condition of the chorionic villi It may follow No 2, or occur without hydatidiform cyst formation

Illustrating the conditions from personal experience the records of two cases bring the nature of the conditions to prominence Following abortion of the fœtus the placenta should be expelled within a limited number of days, usually two Failure of expulsion of the placenta is suggested by continued uterine bleeding In rare instances the placenta does not become detached but stays alive in the uterus and uterine bleeding stops This condition is known as a carneous mole One African female prisoner, of feeble mentality, maintained that she was pregnant for six months There was no visible or palpable enlargement of the uterus as felt through the abdominal wall On bimanual examination the uterus felt slightly enlarged It was considered that the patient was not pregnant One month later she developed violent lower abdominal pains, not associated with diarrhœa or frequency of micturition After four hours of this severe pain, in spite of sedatives, she evacuated a placenta per vaginam The placenta was small and fibrotic and there was no evidence of hydatidiform cyst formation This was a non-malignant condition termed a carr
pain and two months' a
unruptured ectopic pre
had a very large blood supply At operation the entire broad ligament area and ovary on the right side were overrun by massive blood-vessels and it was found impossible to remove the mass alone because of severe bleeding The possibility of a hydatidiform mole in an ectopic pregnancy was considered and a total hysterectomy was also undertaken Fig 137 shows the specimen of uterus and right tube removed Much of the mass of hydatidiform cyst-like material was removed and sent to the laboratory before the photograph was taken The patient's wound healed without infection She developed a slight hæmoptysis during early convalescence She left hospital three weeks later X ray examination of the chest showed much irregular mottling The patient developed paraplegia at

if there is any evidence of pelvic peritonitis Abdominal muscle guarding in abortion cases is frequently due to fulminating peritonitis from damage to a loop of small bowel following perforation of the back of the cervical canal and curettage through the perforation In one case seen masses of fragments of small gut had been curetted through the cervical perforation into the vagina It is worth looking for such fragments in cases where peritonitis is present and criminal abortion is suspected

Spontaneous abortion is due in some instances to chronic pelvic disease affecting the Fallopian tubes or the ovary This can usually be detected on bimanual examination of the pelvis Many so called spontaneous abortions in the tropics are due to tropical diseases such as malaria, filaria, amœbic dysentery and possibly schistosomiasis Histoplasmosis is a disease which is being recognised with increasing frequency in South America and the Southern States of North America Winckel,[21] working in Dutch Guinea where the condition is comparatively common, considered that microscopic evidence of this disease could be found in a high proportion of cases of menstrual disorder The condition may precipitate abortion As histoplasmosis has been detected in South, Central and West Africa, it is worth considering this form of infective reticulosis as a possible cause of interruption of pregnancy in tropical countries All these conditions give rise to chronic pelvic congestion and are associated with marked anæmia The highest risk period for spontaneous abortion is the third month of pregnancy Many spontaneous abortions are complete and do not require any form of instrumental treatment It is desirable following an abortion to give patients a course of prophylactic drugs against the possible spread of sepsis There is much sterility caused by septic abortions with inadequate control of infection and consequent obstruction to the inner ends of the Fallopian tubes In most instances there is little concern shown for patients who have a spontaneous abortion with a normal convalescence but in view of the very high incidence of chorion epithelioma in tropical countries, as compared with temperate areas of the world, it is suggested that all patients who have suffered from abortion require systematic examination at one month and three months after the abortion Hou and Pang[9] comment on the relatively high incidence of chorion epithelioma in Hong Kong The condition was noted once in every 114 post mortem examinations carried out under their observation This gives a chorion epithelioma rate of 1 per 3,708 pregnancies, this is a much higher incidence than in Europe Acosta-Sison[10] reports on the relatively high incidence of this condition in the Philippine Islands She draws attention to the fact that in Japan, where abortion was legalised for some years, that the incidence of chorion epithelioma was markedly increased after two to four dilatations and curettage of the uterus The risk appears to be greatly increased by repeated pregnancies Chorion epithelioma is a most serious condition

Patil series (India)[19]

One chorion carcinoma for every 4 2 mole pregnancies
One chorion carcinoma for every 285 abortions
One chorion carcinoma for every 6,796 deliveries

or from some *site in the nervous system* Acosta-Sison [11] comments on the common finding of enlargement of the uterus and bleeding following an abortion where chorion epithelioma develops She noted this sign in eight out of eleven of her cases Secondary growths are found commonly *at an early stage* During normal pregnancy gonadotropin is excreted in the urine in varying amounts, the maximum being up to 140 international units per cubic centimetre of urine It is noted, however, that where chorion epithelioma develops there is a markedly raised gonadotropin excretion above the normal pregnancy level T'ien Shueh Ping [6] records a most valuable method of detecting the presence of chorion epithelioma by undertaking a "quantitative dilution test" on the urine of suspect cases of chorion epithelioma using a technique like the toad pregnancy test, but with varying dilutions of urine By this test, the details of which are given in an extract, it will be seen that in cases of chorion epithelioma the excretion of gonadotropin *in the urine may exceed 2,000 international units per cubic centimetre* as opposed to the amount excreted in a case of normal pregnancy with a maximum of 140 international units excretion per cubic centimetre of urine This writer, discussing his series of cases, suggests the following signs as being most characteristic of the condition

1 Undue enlargement of the uterus for the duration of pregnancy
2 Accompanying vaginal bleeding with the unduly enlarged uterus
3 Hæmoptysis in a pregnant woman as seen in 14 6 per cent of the cases
4 Expulsion of hydatidiform vesicles per vaginam in some cases
5 Absence of fœtal parts in X-ray photographs after the fourth month of pregnancy
6 Absence of fœtal heart sounds after the fifth month of pregnancy

In suspect cases where chorion epithelioma is suspected, it is very helpful

content of the blood is much raised, this substance is present in the cerebrospinal fluid This is a very important observation and if in doubt of the diagnosis, it is *well worth undertaking a lumbar puncture and testing the cerebrospinal fluid* for gonadotropin, using mice or toads, whichever is preferred If the test is positive it can be confidently affirmed that the case is one of chorion epithelioma

There is a close association between fœtal abnormalities, hydramnios and premature labour Miscarriage between the fourth and sixth months of pregnancy is sometimes due to fœtal death or abnormality If a miscarriage occurs and the contents of the uterus have to be completely evacuated great care is necessary at this stage of pregnancy not to damage the uterus which *is soft and becoming thin-walled* No sharp instruments should be used Premature labour is predisposed to by any condition which has associated with it a marked degree of *anæmia causing* a degree of fœtal anoxæmia Drury,[12] working in the Dublin maternity hospitals, considered that anæmia in pregnancy is one of the greatest causes of morbidity following labour and fœtal loss by prematurity The average

home three months later, and so was readmitted to hospital, where she died soon afterwards At post-mortem examination there was evidence of extensive spread of chorion epithelioma throughout the body which had developed in a hydatidiform mole ectopic pregnancy About 50 per cent of cases of chorion epithelioma are preceded by hydatidiform mole The paraplegia was due to involvement of the



FIG 137
Hydatidiform mole in right sided ectopic pregnancy

spinal cord with the malignant condition Madden [20] traced the origin of chorion epithelioma in 445 cases and found as follows

1 Uterine moles (203)	44 0 per cent
2 Uterine abortions (135)	30 0 per cent
3 Labour at term (99)	22 0 per cent
4 Ectopic pregnancy (12)	2 6 per cent
5 Other origins (6)	1 3 per cent
	100 0 to nearest figure

In some instances chorionic epithelioma growths recede after removal of the primary condition The features which indicate the presence of chorion epithelioma arising in the uterus are

1 Vaginal bleeding recurring subsequent to complete abortion
2 Further enlargement of the uterus subsequent to the abortion
3 Development of cough and hæmoptysis following abortion
4 Internal hæmorrhage one or two months after an abortion

The use of testosterone following the removal of the uterus for chorion epithelioma appears to be beneficial in retarding the rate of growth of secondary deposits of this form of neoplasm Chorion epithelioma ultimately kills the patient by various forms of hæmorrhage—uterine, vaginal, intestinal, pulmonary

dose method of treatment of malaria using Camoquin—three tablets—is considered excellent in pregnancy cases, as in surgical cases Mepacrine or Daraprim can also be used in pregnancy cases but with these latter drugs the course covers several days Jordan,[15] investigating the incidence of filariasis in patients suffering from abortion, noted that the incidence of microfilaria in the blood was very much higher in the cases of abortion than in a control group of patients Microfilaria is treated most suitably by intravenous injections of Antrypol, *1 gm* weekly, for three to five weeks This drug is not safe to use if there is more than a trace of albumin in the urine, as *it may affect the kidneys adversely* The urine should be tested for albumin on each occasion before injection is considered Banocide *is an alternative drug for the treatment of filariasis*—dosage, 50 mg tablet three times a day for one week This substance gives rise to severe itching of the skin, but this can be alleviated by the use of an antihistamine drug Filariasis sometimes gives rise to elephantiasis of the breast which, during pregnancy, may assume enormous proportions as shown in illustration 252, Chapter 25 Women in the tropics who suffer from concurrent disease during pregnancy and are for this reason confined to their house and deprived of sunshine may suffer from osteomalacia With softening of the pelvic bones the effect of the body weight transmitted through the pelvis on to the hip joints and the sacrum is that there is a gross triradiate distortion of the pelvic brim which precludes normal delivery In almost all cases of this type the patients have, as a result of illness or custom, [illegible] and not by choice [illegible] ops [illegible] tus [illegible] for the purpose of blood formation and bone construction with its development *Where tropical diseases such as malaria, schistosomiasis and ankylostomiasis are* commonly found there is frequently an acute drop in the hæmoglobin level during *pregnancy The hæmoglobin level often reaches an alarmingly* low figure A hæmoglobin level of 50 per cent is not unusual and it is often as low as 35 per cent *Ascariasis also adversely affects the hæmoglobin level Treatment of ankylostomiasis* by 3 c c tetrachlorethylene preceded and succeeded by a saline aperient the night before treatment and four hours *after ingestion of the tetrachlorethylene is* suitable This is safer in pregnancy cases than oil of chenopodium Large doses of iron, folic acid and vitamin B_{12} are a great advantage also in the treatment of the anæmia of pregnancy In view of the high incidence of cephalhæmatoma and intracranial hæmorrhagic accidents, as well as bleeding from the umbilical cord, it would appear that the vitamin K level of the blood of the mother in the tropics tends to be unduly low Harris[16] pointed out that 37 5 per cent of neonatal deaths are associated with various forms of hæmorrhage in the newborn The vitamin K level appears to be much lower in mothers who have suffered from toxæmia of pregnancy than in women who have had no indication of toxicity

A condition requiring surgical treatment during pregnancy which has been noted personally on several occasions is epulus, where a rapidly growing mass of granulation tissue develops about the bases of the teeth The condition is sufficiently well known to be termed epulus gravidarum This small tumour, possibly due to a deficiency of vitamin C causing spongy gums, is noted to grow

hæmoglobin level in antenatal patients in many tropical countries where malaria, helminthiasis and schistosomiasis are prevalent is commonly in the region of 50 per cent To decrease the rate of spontaneous abortion, attention to nutrition and hæmoglobin levels is most important

Two urgent and serious conditions calling for prompt treatment of hæmorrhage in the latter months of pregnancy are accidental hæmorrhage due to placenta prævia and concealed accidental hæmorrhage into the retroplacental space, following partial separation of the placenta from the uterine wall Blood loss from the circulation gives rise to evidence of hypovolæmic shock in the patient affected Both conditions are best treated by initial blood transfusion, and then according to the severity of the loss and possibility of blood replacement, early delivery of the child by Cæsarean section or conservative means with induction of labour must then be considered

PREGNANCY AND CONCURRENT DISEASE

All young healthy adults at the zenith of their physical fitness have a wide margin of reserve in the functional efficiency of the various structures in their bodies These reserves are called upon when tissues are damaged by disease or by the inevitable changes of advancing age Pregnancy adds an additional strain which may be of a temporary nature only, though in some cases such changes are irreversible One of the aspects of antenatal care should be the investigation and detection of illness with late surgical implications Such an outlook is a natural concern of those who may at a later time be called upon to deal with surgical conditions starting in the antenatal period of life Some disturbances of development might, with care, be avoided altogether by appropriate antenatal treatment Illness in a woman during pregnancy is liable to be reflected in the health of her child It is, therefore, most important to ensure at an early stage that the woman's general health is of a high standard throughout her pregnancy In tropical countries, where medical and surgical staffs are frequently inadequate to give more than limited attention to patients who are not critically ill, it is considered that where more than 50 per cent of patients suffer from any individual condition, it is wiser to treat all the patients for such conditions without necessarily carrying out individual tests, so long as the methods of treatment are safe, it is a good economy of labour The saving in cost of labour is much greater than the additional cost of medicines used By this method more time is also available for critically ill patients who require additional special care All indigenous patients in the tropics can be treated with advantage for avitaminosis, malaria, anæmia and helminthic infections The patient may indicate particular features which require investigation For these patients laboratory examinations can be undertaken on blood, urine and stool Thick blood films are more satisfactory for the detection of blood parasites than thin smears In areas where trypanosomiasis and filariasis are prevalent thick wet preparations of blood give much the highest number of positive results Rao,[11] working in India, is of the opinion that malaria causes abortion, miscarriage and premature labour Patients require treatment for this condition during pregnancy as a routine procedure Subtertian malaria is more liable to cause interruption of pregnancy than benign tertian malaria The single

Associated with the toxæmia of pregnancy there is a marked strain on the liver Subacute or acute liver degeneration is occasionally seen Because of the risk of liver damage during pregnancy there is a lesser margin of safety than normal where surgical procedures are required Chloroform is not a suitable anæsthetic to give to patients suffering from toxæmia of pregnancy, ether is much safer In the absence of obvious acute rheumatic fever in African patients, very few cases of heart disease have been encountered during labour in African patients

Pulmonary tuberculosis is now more common in tropical countries than in temperate parts of the world The condition is sometimes much aggravated by pregnancy Progressive pulmonary tuberculosis is usually considered an adequate justification for termination of pregnancy by those who do not object to therapeutic abortion on ethical grounds The strain of parturition on a patient with pulmonary tuberculosis is a considerable danger and Cæsarean section may have to be considered in cases with even slight degrees of disproportion Spinal anæsthesia is the most suitable type of anæsthesia in most of these cases Great care must be taken to avoid chest complications as production of a cough seriously increases the chance of wound disruption

Patients who develop pneumonia during pregnancy run a serious personal risk and the likelihood of fœtal loss in this condition is in excess of 50 per cent Dysentery or enteritis of any sort during pregnancy is liable to precipitate termination of the pregnancy at any stage Dehydration due to diarrhœa is liable to precipitate uterine contractions and loss of the pregnancy Such conditions require urgent appropriate treatment with adequate replacement of fluids lost

Acute appendicitis during late pregnancy is a dangerous condition and somewhat difficult to deal with because of the enlargement of the uterus present If a patient has an attack suggestive of appendicitis during early pregnancy the appendix should certainly be removed Removal of the appendix during early pregnancy has not been known to disturb the pregnancy

Acute intestinal obstruction due to adhesions may be precipitated by the displacement of adherent bowel loops with the enlargement of the uterus Operation may be required in these cases

Diabetes during pregnancy predisposes to a greater risk of toxæmia and hydramnios Associated with diabetes there is a high incidence of fœtal abnormality In view of the high risk of the transmission of this disease to the child from a diabetic mother it is often advisable to consider sterilisation to prevent further pregnancies

Fungoid conditions about the vulva and vagina are more liable to occur during pregnancy than at other times They are also increased by the use of tetracycline antibiotic drugs which are given for some other condition requiring treatment during pregnancy Local cleansing, weak mercurial lotions and the use of the antibiotic drug active against fungoid conditions called Mycostatin are considered to be most beneficial in treatment

Condyloma acuminata is a virus infection giving rise to an extensive warty condition of a wet character about the vulva and vagina It is markedly aggravated by a pregnancy The growth as seen in Fig 112 may be sufficient to preclude vaginal delivery Diathermy treatment of this type of growth at an early stage

much more quickly during pregnancy than when a female patient with epulus is not pregnant When an epulus of this type is removed the blood which the patient spits out has a strong smell simulating that of a normal placenta It has been possible that the abnormally high growth rate may be due to the action of gonadotropin The bleeding from these very hæmorrhagic tumours may be so profuse that it is very alarming to the patient if operation is not undertaken under general anæsthesia Under the circumstances, it is better to deal with this condition under general anæsthesia It is usually necessary to remove one adjacent tooth to ensure complete removal of the mass

European women in the tropics, when they become pregnant, frequently complain that they are unfit to have another child as they have had malaria Malaria is an eminently treatable disease and is in itself not an adequate or sufficient cause to justify termination of pregnancy Chronic malaria in indigenous patients may give rise to a sufficient degree of softening of the spleen to precipitate a spontaneous rupture of that organ Cases of this type have been reported but have not been seen personally

Sickle cell disease*, already given some consideration, is a matter of serious concern to doctors working amongst African patients Thalassæmia is a closely allied type of condition, has a much wider distribution and is noted in the Mediterranean area of the world and with extensions into parts of Asia Children with sickle cell anæmia, that is, having one sickling gene from each of the respective parents, seldom reach adult life Many female patients in Africa who are pregnant suffer from cell trait, that is, they have one sickling gene from one of their parents The proportion in the population is about 20 per cent These patients usually deliver live children and survive Many unexpected deaths, however, occur in such patients about one day following normal delivery The sickle cell crisis is precipitated possibly by the strain of the second stage of labour with inco-ordinate respiration and consequently a degree of anoxæmia which predisposes to blood sickling It is considered that the psychoprophylaxis method of painless labour might be a great advantage in these cases By instruction and training during pregnancy better personal control is developed with a decreased risk of anoxæmia It is advisable in African patients to test the blood for sickle cell trait before the first child is born The knowledge of this disease being present may suggest methods of treatment to guard against the anoxæmia induced by the distress of labour The use of oxygen during the second stage of labour is beneficial in known cases of sickle cell disease and is an obvious advantage The blood hæmoglobin level should be kept as high as possible in these cases prior to delivery, because of the potential danger of this condition

The condition of sprue or fatty diarrhœa with emaciation, sore mouth and macrocytic anæmia and a disturbance of blood calcium has not been seen in African patients Cases have been seen in European women and this is a serious condition in pregnancy Iron, liver and vitamin B as well as intravenous calcium seem to be most effective in treatment The condition is associated with long residence in India and the Far East

* Tab 0 1 gm metabisulphite of soda for Williams and Mackey s sickle cell test (see page 50) now available from George J Gurr Ltd 136 New King s Road London S W 6

Direct aspiration through the abdominal wall is considered the safest route as there is the least risk of sepsis

In tropical countries the possibility of hydramnios being due to infection with toxoplasmosis should be kept in mind Even if this condition exists in the mother she may be without constitutional symptoms If more than one abnormal child is born to the mother appropriate examinations should be carried out for its detection The seriousness of virus infection during pregnacny should be kept in mind The matter of maternal infection during pregnancy is given further consideration when dealing with fœtal abnormalities which may be due to these causes

In many parts of the tropics it is noted that adenoma of the thyroid gland is frequently found to start in the mother soon after the birth of a child It is considered that this condition is likely to be precipitated by hæmorrhage into the gland at a time when it is congested during pregnancy The major risk probably takes place when the woman is in the second stage of labour In patients with a tendency to hæmorrhage with a low vitamin K blood content this is a particular risk In educated African women, who are more liable to complain of minor disabilities and abnormalities than illiterate persons, it has been found personally that where a small nodule has developed in the thyroid gland soon after childbirth the mass is usually found at operation to consist of an encapsulated area of blood, and possibly with a little thyroid tissue present These small encapsulated masses are not difficult to remove under local anæsthesia Noting this condition suggests the advisability of giving vitamin tonics to women late in pregnancy in districts where goitre conditions are prevalent

The early vomiting of pregnancy is possibly due to an allergic condition due to the inception of a fœtus of a different blood type than that of the mother and due to the blood group of the father This suggestion is made on the ground that it has been observed that in women who do not vomit at all during pregnancy are almost invariably found to be of the same blood group as their husbands Chlorpromazine, in 50 mg tablets, is a very useful drug in controlling the vomiting of pregnancy (Barry [18]) Bromides and alkalis are also useful

Testing of urine for albumin is an easy and tolerably efficient method of excluding serious tubuloglomerulonephritis In some instances where there is no albumin present, or only very little, there may still be a lowered kidney efficiency with marked nitrogen retention A modification of the Rosenthal water excretion test with measurement of specific gravity is useful The patient is taken off water by mouth from 6 P M in the evening, and no fluid allowed during the night The morning specimen of urine should reach a specific gravity of 1,025 One litre of water is then taken by mouth and if the kidneys are working efficiently 800 c c of urine should be excreted within the next four hours Specimens are taken approximately half-hourly and measured for specific gravity If the kidneys are working efficiently the specific gravity figure falls as low as 1,002 with the diuresis If the kidney efficiency is low the specific gravity never falls below 1,010, it remains constantly close to this level Patients who have kidneys of low excretory efficiency are liable to toxæmic conditions If urinary excretion tests are considered to be below normal nitrogenous food should be decreased in the diet Associated with poor

or the local use of podophyllin in oil before it gets out of control is important The local use of triple sulpha cream is also beneficial In advanced cases at full-term pregnancy it is necessary to undertake Cæsarean section for delivery of the child The risk of sepsis following operation is very high when this condition is present

The matter of the quantity of amniotic fluid present in the amniotic cavity during pregnancy is a matter of concern If there is insufficient fluid present and the woman has a firm tight uterus closely adherent to the underlying fœtus there is a high risk that the fœtus will develop club-foot with equinovarus deformity on one or both sides The baby is frequently born with pressure marks over the tips of the fibula due to uterine pressure of prolonged duration If insufficiency of amniotic fluid is suspected the patient should be given a marked increase in salt in the diet with a view to producing some degree of fluid retention The other extreme of fluid content in the amniotic cavity is hydramnios, where there is an excess of fluid present This condition often gives rise to serious complications The mechanism of fluid volume control in the amniotic cavity is a matter of conjecture It has been noted that hydramnios is associated with a high incidence of fœtal abnormality and fœtal death There is a considerable possibility that amniotic fluid is removed from the amniotic cavity by the fœtus swallowing this substance and then excreting it through the placenta back into the mother's circulation, the placenta acting in a manner rather comparable to a kidney The mother receives it from the fœtus then excretes it herself The amniotic fluid removed is replaced by new fluid secreted by the amniotic membrane If the fœtus dies it ceases to swallow amniotic fluid and in this way there is a rapid accumulation of amniotic fluid which is not excreted in the manner suggested

If hydramnios develops it is advisable to X-ray the mother for possible fœtal bony abnormality, as noted particularly about the contour of the skull Hydramnios is common in anencephaly The method of treatment of hydramnios frequently is a matter of concern to those undertaking surgery and obstetrics with limited experience in out-stations, in cases where medical treatment is found to be inadequate Barry,[17] in surveying 100 cases of hydramnios dealt with the condition by rest, restricted fluids and diuretics in thirty-eight cases Cases treated by puncture of the membranes through the uterine cervix, high up on the lateral uterine wall position numbered thirty nine Aspiration of amniotic fluid direct through the abdominal wall, using a fine-bore lumbar puncture needle was resorted to in twenty-three cases Each method has its particular application Where direct aspiration of amniotic fluid is resorted to through the abdominal wall, it is advised that the aspiration of amniotic fluid is made at the side of the uterus corresponding to the fœtal back, if this can be felt This is so that the placenta on the side opposite to the fœtal back is avoided, thus decreasing the risk of hæmorrhage If the fœtal back cannot be felt, tapping should be undertaken at the position where the fluid thrill is most easily detected The placenta is not likely to be situated under this site Large quantities of fluid can be removed without labour being precipitated In one instance 14 pints was removed The fluid is allowed to leak slowly through the lumbar puncture needle for several hours Patients are greatly relieved by this method of dealing with hydramnios

for child-bearing is therefore based more on the relationship of the various pelvic measurements to each other than on the actual figures themselves "Tall" women over the height of 5 ft 6 in (167 64 cm) usually have less difficulty in labour than "short" women, 5 ft 2 in (157 48 cm) and less It is noted, however, that when comparing the pelvic measurements in tall women and short women that a loss of stature is associated with a marked loss in the length of the transverse diameter of the pelvic brim but *relatively little decrease in the anteroposterior* or internal conjugate diameter Small women have therefore a more circular shaped pelvis than tall women The loss of width in the transverse diameter is less serious than a decrease in the length of the anteroposterior diameter or internal conjugate length Small women below the height of 5 ft 2 in (157 48 cm), in spite of the smallness of the pelvis, do not necessarily therefore have as much difficulty in childbirth as one might expect considering the loss of width in the transverse pelvic measurements The instance of obstetrical obstruction in all women irrespective of their height is greatly increased by advancing age Abnormalities in the symmetry of the pelvis due to leg defects, such as muscular

therefore be made about injuries or disease in earlier life If there is abnormality of a limb noted, atrophy of muscles, or limitation of a joint, the pelvis should in all cases be X-rayed If X-ray facilities are not available, it is usually possible to detect lack of symmetry of the pelvis by digital examination per rectum Cæsarean section is frequently necessary in cases of brim abnormality due to old standing limb disease In tropical countries it is not uncommon to find grossly deformed *and crippled patients becoming pregnant In one instance an achondroplasiac* dwarf patient 3 ft tall and with bilateral club feet (Fig 138) became pregnant and was delivered by Cæsarean section In other instances patients with tuberculous kyphosis of the spine and pelvic deformity have been seen at antenatal clinics These patients *almost invariably require delivery by section*

Probably the most important single internal pelvic measurement is that of the internal conjugate diameter This is the shortest diameter of the pelvic inlet In tall women the 'inch rule" applied to external measurements is a practical method of estimating quickly and with fair efficiency whether the woman is *likely* to have a labour which is easy, difficult or obstructed A record from my notebook written many years ago is of value, it correlates the *likely* type of *labour with the* relationship between the interspinous and intercrestal measurements

Difference over 2 in (5 08 cm +)	Very easy labour likely
Difference of 2 in present (5 08 cm)	Good measurement, normal labour likely
Difference of 1½ in (3 81 cm)	Strong labour, may require forceps
Difference of 1 in only (2 5 cm)	Will be difficult, forceps or Cæsarean section
Difference below 1 in (2 5 cm −)	Will certainly need Cæsarean section

This rule does not apply to short women as they tend to have a more circular pelvic inlet with loss of transverse diameter, but relatively less loss of internal

nitrogen excretion the patient is liable to develop a rising blood-pressure, with increasing risk of eclamptic fits If a pre-eclamptic condition is recognised with a rising blood pressure and albuminuria, which does not respond to rest and low diet during the latter four weeks of pregnancy, induction of labour is indicated If eclamptic fits continue to occur the patient is better delivered by Cæsarean section Eclamptic fits developing after delivery of the child are more serious than those developing before delivery

The risk of gonorrhœal infection in the mother infecting the eyes of the newborn infant during childbirth must be guarded against and it is advisable to treat the infant's eyes at birth to prevent ophthalmia neonatorum Silver nitrate 1 per cent is suitable for this purpose

In considering the detection of syphilis in the mother in the tropics and the possibility of this disease being communicated to the infant, it should be remembered that many tropical diseases giving rise to a positive Kahn reaction are not necessarily syphilis A Kahn reaction may become positive temporarily following an acute attack of malaria It is frequently positive to a low titre in cases of old yaws infection Only if the result is plus three or plus four should marked stress be placed on its significance If it is plus one or plus two the examination should be repeated after two months If the titre is rising treatment as for syphilis should be undertaken The husband should also be investigated for this disease

ASSESSMENT OF DISPROPORTION

One of the most important aspects of antenatal work is the assessment of a patient's likelihood of a normal delivery and the detection of features which might suggest the possibility of a difficult or obstructed labour The facility with which a child is born depends on the mother's uterine functional efficiency, the size, shape and proportions of the maternal pelvis and the normality of the soft tissues, as well as the size and position of the child at the time of onset of labour Because of the many factors involved it is not possible to state with certainty that a woman will have a normal delivery Continued vigilance is therefore necessary At an early stage in the pregnancy the pelvis of the patient should be assessed to see if it complies with the measurements which are required or which if present suggest that normal delivery is likely to take place, the child being normal in size for such a mother, and well positioned at the onset of labour

Midwifery is a very controversial subject and the obstetrical methods and standards of one part of the world are not necessarily entirely suitable for patients in other parts of the world, who have a somewhat different type of physique It is therefore proposed to consider pelvic assessment as a comparative study taking into consideration the findings of obstetricians working in different parts of the world and using personal experience to illustrate the advantages and disadvantages of the various approaches as applied to this important subject in the tropics

In the latter months of pregnancy the fœtus adapts itself in the uterus to a position suitable for the onset of labour Women vary greatly in height, hence pelvic measurements also vary greatly Assessment of suitability of the pelvis

head, 3 5 in (8 89 cm) was considered an average head, and 4 in (10 16 cm.) was considered a large head Very little room is taken up by soft tissues over the bone at each end of the internal conjugate diameter It is necessary to allow half an inch (1 27 cm) for soft tissues of the lower segment of the uterus, the bladder presumably being kept empty It is therefore necessary to have as a minimum a 4 in (10 16 cm) internal conjugate diameter to have a reasonable chance of a spontaneous delivery Munro Kerr [25] maintained that a trial labour should not be attempted if the internal conjugate measurement is down to 3½ in (8 89 cm) If the baby does get through it will almost certainly have a cerebral hæmorrhage from damage to the sagittal sinus, due to excessive overlapping of the skull bones, unless it is an exceptionally small baby It has been found on investigation that with a 4 in (10 16 cm) internal conjugate measurement, which is the minimal length consistent with a fair chance of successful spontaneous vaginal delivery, the results were as follows

Spontaneous delivery	59 0 per cent. of cases
Forceps delivery	*25 6 per cent of cases*
Cæsarean section	15 4 per cent of cases

Of cases going to Cæsarean section 15 4 per cent is obviously a very high section rate and it is considered that a patient should have not less than a 4½ in. distance (11 43 cm) between the promontory of the sacrum and the lowermost point of the bridge of the pubis to ensure normal delivery (see diagram, Fig 139) The tip of the middle finger of the right hand touches the promontory of the sacrum per vaginam while the position of the bridge of the pubis is measured off on the side of the second metacarpal bone with the index finger of the left hand The length marked is measured with a sterilised ruler on removing the hands This measurement is termed the "diagonal conjugate" and is half an inch longer than the internal conjugate length

X-ray examination is of greater value in assessing the relationship between the width of the pelvic brim and the size of the fœtal head at term than for actually measuring the distance between various points of the pelvis It must be remembered that there is considerable mathematical distortion of the picture produced due to the slanting angle of the rays passing between the X-ray tube and the plate, with the patient interposed between the two All measurements on the plate are greater than those of the actual patient due to the divergence of the X rays It has been noted personally that there is a higher incidence of disproportion in the tropics in cases where the husband and the wife are of different tribes, than where they are both of the same tribe Amongst certain tribes it is customary to have an interchange of women in marriage such as amongst Mandingos and Bambaras where the two tribal areas touch territorially This difficulty arises particularly where the woman is of the short stature with heavy bones and a brachycephalic type of head and the man is of the tall stature with dolicocephalic type of skull

Appreciating the limited value of the pelvimeter in obstetrical work in many parts of the tropics, particularly amongst people of short stature, an estimate of chance of delivery per vaginam has personally been made much more on the estimation of the subpubic angle Teaching on this point is not usual in Britain

conjugate length, so that the small woman produces the baby more easily than her external measurements taken with the calipers would suggest When working in forest country in the tropics the patients are usually of short stature, between 5 ft (152 4 cm) and 5 ft 4 in (162 54 cm), and less reliance can be put on pelvimetry and the use of the calipers The pelvimeter is of greatest value in estimating the pelvic measurements of tall women, but it is of very limited use in short stoutly-built women Francis,[22] working in India, was of the opinion that the usual external pelvimetry is of very limited value, many others have expressed the same personal opinion to me and with this there is agreement Jhirad,[23] working in India, found that the average difference between the interspinous and intercrestal measurements in Indian women was 1 in (2 54 cm) and that only 2 3 per cent of these had difficult labours With such a small difference in these measurements in European women one might anticipate a difficult labour in not less than 50 per cent of the cases Pelvimetry in short women gives a very false impression and doctors arriving in the tropics for the first time who have been taught on clinical material in Europe, where the average height of patients is much greater than in many forest areas of the tropics, may easily arrive at a wrong conclusion if they adhere rigidly to the criteria laid down for patients in Europe In open savanna country away from tropical forests patients are usually of much taller stature than those living in forest areas The use of the pelvimeter in these places may be of greater value than when dealing with smaller women of the forest belts Because of the relatively small difference between the interspinous and intercrestal measurements in short patients in the tropics much greater value and significance has been attached to the use of the subpubic angle measurement used in combination with the internal conjugate length Measurement of the external conjugate length in short fat female patients in the tropics is considered of no value whatever for obstetrical purposes



FIG 138
Achondroplasiac dwarf patient delivered by Cæsarean section

The smallest diameter of a baby's head, the biparietal, must essentially go through the smallest diameter of the female pelvis, that is the internal conjugate The relation between the biparietal diameter and the internal conjugate is therefore of extreme importance Sen,[24] investigating the length of the biparietal diameter in Indian babies, noted that 3 in (7 62 cm) was considered a very small sized

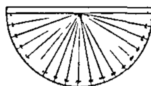
The "critical angle" is considered to be 84 degrees Above this level the labour is *likely to be normal to easy* and below this level difficult or obstructed It must be remembered that the subpubic angle method of estimation must be used *in combination with the measurement of the internal conjugate* diameter of the pelvis It is desirable to have this measurement not less than 4½ in (11 43 cm.) Difficult labour may be anticipated *if it is less than 4 in (10 16 cm)* The chief reason for considering the internal conjugate length in combination with the subpubic angle is that in the case of platypelloid or very flat pelvis it is found that this type of pelvis is associated with an abnormally wide subpubic angle, that is over 90 degrees, sometimes reaching 100 degrees or somewhat above this figure It is therefore necessary to be very careful if the subpubic angle is found to be abnormally wide as in these cases there is frequently a very short internal conjugate diameter Sen [26] notes the varying types of pelvis relative to the subpubic angle as

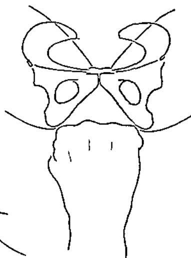
1	Platypelloid	93 3 degrees
2	Gynæcoid	84 72 degrees
3	Android	80 91 degrees
4	Anthropoid	77 6 degrees

The wide subpubic angle over 90 degrees with a short internal conjugate diameter of 4 in (10 16 cm) or less is a type of pelvis which requires caution in dealing with it If the subpubic angle method of estimating the pelvis is employed it is useful to keep a plastic transparent instrument for measuring the angle (protractor) Another method of estimating the subpubic angle is by using the closed fist and interposing it between the ischial tuberosities of the patient (Fig 139) The distance between the outer side of the second and the fifth metacarpal bone of the average hand when clenched is between 80 and 90 mm my own is 83 mm If the distance between the tuberosities of the ischium is 80 mm or over the chances of normal delivery are good *If* the distance is 75 mm or under the chances of normal delivery are poor This estimate again must be *taken in combination with the internal conjugate length* *In order to* note the correlation between subpubic angle and the other pelvic measurements extracts have been appended *giving* the considered opinion of eminent obstetricians working in different parts of the world—records by Sen,[2] Ko Ying-Kuei,[28] Remmelts,[29] Baird [30]

Radiological estimation of the subpubic angle is best made by taking a radiograph of the patient's pelvis while sitting on the X-ray table with the plate beneath her and leaning forward to an angle of 45 degrees The tube is directed at 45 degrees to the table with the rays passing from behind through the patient's posterior aspect In this way the pubic arch is *in a line at right angles to* the line of the X-rays Ko Ying-Kuei [28] points out that on X-ray of the subpubic angle *it appears approximately 3 degrees* wider in the X-ray photograph than is the case on clinical measurement direct This is not a very large amount but must be taken into account An 84 2 degree angle measured clinically was represented by an 87 6 degree angle measured radiologically Fig 140 shows a photograph of the subpubic angle in a small West African woman undertaken in this way The angle seen here by X-ray is approximately 80 degrees on X ray and presumably

as the method is seldom used there Having personally used this method for several years, it is noted with considerable interest on examining the literature that the conclusions arrived at have been almost identical with those of obstetricians working in India and China who use *this method extensively* *To avoid undue* repetition of figures extracts of important articles are given at the end of this chapter which are worthy of the consideration of doctors working in the tropical world, regarding the subjects of normal, trial and obstructed labour The subpubic [illegible] It may on rare occasions [illegible] ormal or average subpubic [illegible] Sen,[26] giving a report on





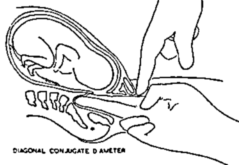


FIG 139
Clinical methods of estimating pelvic dimensions

the Indian female pelvis following observations on a large number of confinements, has come to the following conclusions as regards the likely nature of the delivery relative to the subpubic angle

Subpubic angle 85 2 degrees	Normal delivery
Subpubic angle 80 4 degrees	Low forceps or symphysiotomy

The following figures are taken from my own notes

Subpubic angle 90 degrees	Normal easy labour
Subpubic angle 84 degrees	Normal to strong labour
Subpubic angle 75 degrees	Difficult, forceps likely, consider symphysiotomy
Subpubic angle 70 degrees	Advise Cæsarean section, or symphysiotomy

Green-Armytage [30] considered that 70 per cent of tropical obstetrical calamities were due to persistent occipitoposterior positions of the fœtal head in delivery Directly or indirectly they predisposed to eclampsia, septicæmia, perineal tear, vesicovaginal fistula, rectovaginal fistula, fœtal loss through intracranial hæmorrhage and puerperal morbidity If the fœtus *is in a vertex position and* does not enter the brim of the pelvis at all after the onset of labour, it is most unlikely to do so *in primiparæ*, though it may do so in multipara There is in these cases either gross cephalopelvic disproportion or some structure such as a placenta prævia or a uterine fibroid in the lower segment of the uterus preventing the entry of the



FIG 141
X ray photograph to show internal conjugate diameter
Note undue prominence of fifth lumbar vertebra
(Photograph by kind permission of Mr S C Bose, F R C S Ed, M R C O G)

fœtal head into the pelvis If the head is well flexed, descent is easier, if there is good descent with the pains, rotation automatically occurs Breech positions in primiparæ are *liable to be associated with a more prolonged labour than the vertex* position In a multipara a breech presentation is of no serious import and delivery is usually quite straightforward An effort need not be made in multiparæ in the latter six weeks of pregnancy to alter the position of the fœtus from breech to vertex It is desirable to undertake an external version before the thirty-sixth week of pregnancy *in a primipara* if a breech presentation is detected It is desirable if detected to do the version at the thirty fourth week It is seldom safe or possible to alter the position if it is first noted after the thirty-sixth week It is most important to examine antenatal patients at the thirty-fourth week for this reason If there is any ambiguity existing as to the position of the fœtus or a possibility of disproportion existing near term an X-ray photograph should be taken if apparatus is available An X-ray examination is a routine procedure and in primiparæ it is a good practice *if this is possible*

slightly less on clinical examination—an anthropoid type of pelvis The X-ray picture taken to show the internal conjugate diameter (Fig 141) shows a short length in this axis due to prominence of the sacral promontory The case was treated by Cæsarean section It is rather difficult to see the bony points of the pelvic brim precisely on a lateral view because of the accessory bony shadows of the upper end of the femur

Morris,[31] working in Britain, attempted the obstetrical evaluation of the subpubic angle by inserting an 8 cm wide metal disc, approximately the same as that of a closed fist, between the rami of the ischium and pubes on both sides To this disc a scale was attached and the distance between the top of the disc and



FIG 140
X ray photograph to show subpubic angle
(Photograph by kind permission of Mr S C. Bose, F R C S Ed , M R C.O G)

the base of the symphysis was measured In this way the subpubic angle was estimated The use of the subpubic angle is not often employed in Britain as a method of pelvic assessment It is much more useful in the type of pelvis seen in the tropics and has naturally been adopted more freely in view of the limited reliance which can be placed on transverse pelvic measurements in women with the more round type of pelvis as seen in the tropics

The vertex position of the infant at the onset of labour is the most common in both primiparæ and multiparæ at the time of onset of labour Breech positions are more common in multiparæ than in primiparæ Right and left occipito-anterior positions are most common in tall women and give rise to least difficulty in labour In short women it seems that the anteroposterior axis of the fœtal skull seems to go through the transverse axis of the brim more commonly than through a diagonal axis and for this reason an occipitoposterior presentation ultimately develops more frequently in short women as seen in the tropics than in tall women as seen in Europe Occipitoposterior presentations are a marked disadvantage and predispose to prolonged labour and numerous complications

useful standard for teaching purposes that a labour not exceeding twenty four hours from the time of its onset to the time of the birth of the child be classed as a "normal labour" Labour lasting more than twenty-four hours, but less than forty-eight hours, is classed as "difficult labour" and labour lasting more than forty-eight hours is classed as "obstructed labour"

On analysis of a large series of cases Holland and Bourne [31] estimated the grade of labour in 2,694 primigravidæ on the bases of the first, second or third twenty four hours as corresponding to normal, difficult and obstructed labour The stage of gestation at the onset of labour was also recorded and the following instructive figures were arrived at

	Thirty-eighth Week	Thirty ninth Week	Fortieth Week	Forty second Week	Labour Grade
	Per cent	Per cent	Per cent	Per cent	
First 24 hours	65	41	41	29	Normal
Second 24 hours	25	41	42	47	Difficult
Third 24 hours	10	18	17	24	Obstructed

The whole time of labour is not necessarily strong labour throughout, it represents the total time of labour irrespective of its intensity, from onset to time of birth of the child

Complications of childbirth may arise after delivery of the child such as *post-partum hæmorrhage or retention of the placenta These conditions should* be classed as complications of labour rather than difficult labour *per se*, and are not considered here

Women are naturally very worried if, following one difficult labour, they again become pregnant They fear a recurrence of their adverse experience In investigating these cases it is most important to obtain an accurate history from the patient concerned in the antenatal period If delivery occurred in hospital *the records should be referred to, if necessary by post if in another district*, to ascertain the precise nature of the difficulties which arose and how they are likely to have been caused, whether due to an abnormally large child, malpositioning of the fœtus at the onset of labour, or because of the patient's health precipitating eclampsia If the early difficult labour was due to a rectifiable cause there is reason to expect that normal delivery may be possible with care during the antenatal period and the subsequent childbirth, and the woman has no obvious indication *of poor pelvic measurements Where Cæsarean section was* undertaken it is advisable to note the type of operation performed There is a slightly greater risk of rupture of a Cæsarean section scar if the operation was *of the classical* type rather than of the lower segment variety It can usually be taken that if the woman's first child was born alive and without evidence of intracranial hæmorrhage the "difficult labour" complained of was not of the extreme type Patients are sometimes seen who have a prolonged labour without any indication of *defective pelvic measurements* Such women usually have poor uterine action

Another cause of prolonged labour which may be difficult to detect without an X-ray photograph is a "breech with extended legs," that is to say the legs being straight at the knees and fully flexed at the hip joints, so that the feet are placed in front of the face Delivery occurs in these cases, but it is invariably slow If there is a breech with extended legs in an elderly primiparæ it is advisable *to do a Cæsarean section rather than risk a prolonged labour with possible fœtal* loss Transverse positions of the fœtus are highly dangerous and are liable to serious complications Prolapse of the arm in these cases is not uncommon and other complicated positions may develop If a transverse lie is suspected, X-ray examination should certainly be undertaken This position can seldom be rectified and Cæsarean section is frequently necessary in these cases for delivery of a live child

With anencephalic infants labour is liable to be protracted and difficult If *a normal fœtal head enters the pelvis with difficulty there is a high risk of* intracranial hæmorrhage due to extensive overlapping of fœtal skull bones Sen [41] estimated the anticipated moulding or overlapping of fœtal skull bones with normal and abnormal delivery—normal overlapping of 1 83 mm was considered average The danger limit of overlapping was 2 27 mm where blue asphyxia developed and in extreme cases where white asphyxia occurred the overlap was as much as 3 30 mm which was highly dangerous The major risk of overlapping *of skull bones is intracranial hæmorrhage at various sites due to tearing of blood* sinuses

It has been noted in West Africa that there had been a tendency in the past twenty years towards a marked increase in the size of the babies produced, this is probably associated with better economic conditions and improved health and nutrition of the parents Under these circumstances there is liable to be a slight increase in the Cæsarean section rate in the present generation This temporary *rise is likely to be followed by a decrease in the rate as these larger and healthier* babies reach maturity and become the mothers of the next generation

The extent to which soft tissue obstruction occurs has been indicated in the sections dealing with Genito-urinary Disease in the Female and under Ritual Operations Vaginal stricture formation due to irritant tampons being inserted into the vagina and soft tissue secondary to varying degrees of female circumcision are the main causes of non-bony obstruction in the tropics

FURTHER PREGNANCY AFTER DIFFICULT LABOUR

This matter of the management of a further pregnancy following a previous difficult labour constantly arises in obstetrics in all parts of the world In view of the high proportion of cases of obstructed labour in women of short stature living in tropical forest areas, this subject is of great importance to all doctors working in the tropics Heyns [37] expressed the opinion that the Bantu female is a better parturient than European women This cannot be said of the indigenous patients of East or West Africa where there is a much higher percentage incidence of obstructed labour than amongst European women

The term "difficult labour" essentially implies a relative element There is no set criterion of what constitutes difficult labour, but it can be taken as a

oil and quinine is unlikely to be successful unless the woman is within a few days of term It is therefore of little use in cases of disproportion as little advantage is gained unless labour is induced not later than two weeks before term, at the thirty-eighth week If induction is desired in the thirty-eighth week, before the fœtal head is unduly large, it is necessary in some cases to use the method of tube induction to precipitate labour Great care is necessary to avoid sepsis It is advisable that the patient be given 1 million units of long-acting "penadur penicillin" with a view to decreasing the risk of sepsis following the introduction of the sterile tube into the uterus Various urgent situations arise in times of national emergency, such as riots and air raids, which make timed delivery desirable In multiparæ close to term rupture of the membranes induces labour within one to six hours in most cases To avoid the risk of sepsis and uncertainty of timing with tube inductions in domiciliary practice R Bowesman [25] used a modified steel thimble for this purpose (Fig 142) Ventral and dorsal openings are made in the thimble with a grinding wheel and a 3 mm spike is turned up as shown on the intervening bridge of metal These openings permit of better tactile sensation for location of the membranes The membranes are ruptured by a scratching movement of the finger and liquor amnii escapes The thimble is made more secure on the finger by attachment of a tape as shown while the other end is wrapped round the finger Spontaneous early rupture of the membranes often occurs in multiparæ and is not necessarily dangerous to the mother or the child The method is not advocated for use in treatment of primiparæ where slow dilatation of the cervix by the amniotic cap of fluid is more important than in multiparæ No anæsthetic is required for this method of induction Holland and Bourne [31] indicate from the figures already given the ease or difficulty of delivery between the thirty-eighth and forty-second week, and it can be seen that there is little advantage gained by precipitating delivery in the thirty-ninth week as opposed to the fortieth week, but there is a considerable advantage gained in case of delivery if the labour occurs in the twenty-eighth week Post-mature babies born at the forty-second week give rise to a high proportion of cases of difficult labour It is therefore advised that if induction is decided upon because of a previous difficult labour, due to poor pelvic measurements, it should be undertaken in the thirty-seventh or thirty-eighth week, but not left later than this date

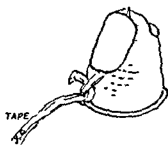


FIG 142

Obstetric thimble for induction of labour by rupture of membranes (Diagram by kind permission of Dr R Bowesman)

In view of the fact that a fertile woman may have repeated pregnancies during her child-bearing period of life, it is obviously desirable, if she has a difficult labour with the first child due to bony disproportion, that serious consideration be given to the matter of her second delivery It is felt that if her pelvic measurements are poor a major advantage can be gained, not only with this her second pregnancy, but with all subsequent pregnancies, if the bony obstruction is permanently relieved during labour by symphysiotomy This method of relief of obstructed labour will be discussed at some length under the subject of Obstructed Labour

and labour continues at a low level for several days until they are well-nigh exhausted, but the pains are not effective in dilating the uterine cervix and there is no obvious fœtal advance These cases are frequently associated with a slightly abnormal position of the fœtus A certain type of woman who has such a labour is liable to have it with each pregnancy without any obvious cause

It is helpful to know the birth weight of the first child and this may be available from hospital records Many Cæsarean section operations are undertaken, with justification, for conditions which do not necessarily indicate that a second operation of the same nature will certainly be necessary This is found in cases of placenta prævia or eclampsia or malposition of the fœtus at term *in utero* Such cases require very careful antenatal observation and appropriate treatment during the antenatal period if there is any albuminuria or a rising blood-pressure

Scarring and damage to soft tissues may be either the cause or effect of an obstructed labour such as in cases of vaginal stricture or infibulation It may equally be the result of an earlier obstructed labour due to persistent occipito-posterior presentation with prolonged labour and formation of a vesicovaginal fistula and extensive local scarring Only in the case of very small vesicovaginal fistulæ in the midvaginal position, which are easily repaired, is a subsequent spontaneous vaginal delivery likely to take place without further damage to the bladder

Vaginal fistula repair essentially causes deep scarring and a loss of elasticity in local structures Some degree of interference with parturition is inevitably caused by repair operations for this condition, unless the fistula is of very small size only Extensive tearing of the perineum followed by suture and scar tissue formation is a possible cause of subsequent interference with delivery In these *cases a timed episiotomy is often needed to relieve soft tissue obstruction as the* scar tissue already present does not stretch adequately

Patients may complain of difficult labour when on investigation it is found there was early rupture of the membranes and early loss of amniotic fluid Slow dilatation of the uterine cervix occurs if there is premature loss of this fluid before adequate dilatation of the cervix has taken place If it is ascertained that this was the likely cause of the prolonged labour it may not necessarily happen on a second occasion

If a short woman has difficulty with her first child she has a higher chance of difficulty with her second delivery than in the case of a tall woman who has difficulty with her first delivery If the cause of the difficult labour is an occipito-posterior position of the fœtus it will not necessarily occur on a second occasion This condition, however, tends to recur in a woman with a small transverse pelvic inlet as is so commonly seen in small women in the tropics

In all cases where an earlier difficult labour has been remedied by Cæsarean section it is desirable to undertake an X-ray examination of the patient three weeks before estimated term to see if there is a likelihood of cephalopelvic disproportion developing with the increase in the size of the fœtal head As difficulty in childbirth usually arises because of the woman's poor pelvic measurements or an unduly large fœtus being present, the difficulty may sometimes be circumvented by induction of labour before the fœtal head is unduly large for the woman concerned The method of induction of labour by the use of castor

Some of the infants had more than one abnormality present, hence the figures. It is extraordinary to note the absence of imperforate anus from this list, a condition which is seen so frequently in neonatal infants in the tropics Also exomphalos is a common condition in the tropics and this is not noted in this series The types of fœtal abnormality liable to give rise to obstructed labour are fœtal monstrosities, hydrocephalus, Siamese twins and iniencephaly Anencephaly usually gives rise to a slow difficult labour, but not an obstructed labour One of the main aims of antenatal work is to assist the patient towards an easy and safe delivery and if an abnormality is present to deal with it at the optimum time in order to reduce complications to a minimum

Various forms of ill health predispose to abnormalities of the fœtus infections such as German measles and toxoplasmosis Metabolic disturbances such as diabetes and hepatitis are also likely to precipitate abnormalities of the fœtus Injury of the mother during pregnancy predisposes to bone defects Hereditary traits may account for some cases of fœtal abnormality Death of the fœtus due to ill health of the mother or structural defect of the embryo itself may cause loss of the pregnancy In the absence of X-ray facilities a fœtal abnormality may be suspected if there is a gross lack of symmetry about the uterus on palpation It may also be brought to notice by a sudden increase in amniotic fluid in the latter months of pregnancy This frequently occurs in the case of defective development of the fœtus in the form of anencephaly Death of the foetus occurs in most of these cases Fraser noted in 1912 that anencephaly was usually associated with defective development or obliteration of the internal carotid arteries, possibly associated with excessive flexion of the head Hydramnios is not uncommon in diabetic women It is also frequent in multiple pregnancies and in cases of fœtal monstrosities Fœtal death occurs in approximately 50 per cent of the cases of hydramnios In about 25 per cent of cases of hydramnios the fœtus is found to be abnormal at birth The presence of hydramnios developing should suggest the possibility of fœtal death or fœtal abnormality The detection of fœtal movement and the hearing of fœtal heart sounds are usually not difficult to detect between the sixth month of pregnancy and full term X-ray examination of the woman's abdomen in the anteroposterior and lateral views after the fifth month of pregnancy is undoubtedly the most efficient method of detection of fœtal abnormalities which are associated with abnormal bony disposition The number of limbs detectable may suggest abnormality The presence of an abnormal skull shadow or an absence of a circular skull outline indicates the presence of anencephaly In the condition of iniencephaly there is hyperextension of the head with deficiency of occipital bony segments The condition frequently gives rise to difficulty in delivery due to failure of flexion of the head and therefore a shoulder presentation develops If a woman in the tropics has one abnormal child, where the defect is referable to the nervous system, the case should be investigated for toxoplasmosis This infective condition giving rise to fœtal abnormalities is being detected with increasing frequency in tropical countries using repeated animal culture methods and the Sabin-Feldman dye test Consideration is given to this condition in Chapter 18 dealing with Infections and Ulcerations German measles also gives rise to mesodermal defects with particular

It affords obvious advantages to a woman who has had one difficult labour, and is likely to have more if she survives, to have some permanent increase in her pelvic measurements produced so that the remedy for her immediate difficulty also ensures her permanent advantage in subsequent deliveries. To relieve obstructed labour by Cæsarean section deals only with the present difficulty without making any adequate provision for the future. If the present and the future can both be dealt with by one operative procedure which does not interfere with the functional efficiency of the uterus itself it holds obvious advantages over Cæsarean section. Heelan,[36] working in Ghana, undertook a most successful series of cases of symphysiotomy for obstructed labour, seventy five operations being performed without any maternal fatalities. Work of this sort is of great permanent value to the people in a district where obstructed labour is so commonly seen. The operation undertaken during labour using local anæsthesia is easier to perform than Cæsarean section; it is an extraperitoneal procedure and with a mortality less than 1 per cent. it has obvious advantages well worthy of consideration.

FŒTAL ABNORMALITIES AND MULTIPLE PREGNANCIES

Great distress is caused to parents who beget abnormal children. Only a limited number of fœtal abnormalities are detectable during the antenatal period of development at the present stage of our knowledge. In view of the serious difficulties which may arise during delivery due to this cause, a short section is included to outline the subject. Doctors working alone in country stations in the tropics who do not have X-ray facilities available may be confronted with very difficult cases, where a woman is seen for the first time in labour which is "difficult" or "obstructed" due to abnormality of the fœtus. Prior to the advent of X-ray examination as a method of detecting fœtal bony abnormalities, recognition of these conditions before delivery was much more difficult than at present and in some instances impossible. In the absence of radiological facilities these conditions may be suspected only when there is interference with the normal course of labour or where there is obvious gross palpable abnormality of the abdomen late in the course of pregnancy. Coffey and Jessop,[37] commenting on congenital abnormalities as seen in Dublin hospitals (Eire), note that major abnormalities occurred in 1.6 per cent. of a series of pregnancies they observed. The incidence given from various hospitals in Europe varies between 1 and 3 per cent. Probably in not more than 10 per cent. of fœtal abnormalities is there interference with delivery. The list of abnormalities detected by these workers shows the following distribution:

Anencephaly	54 per cent. of all major abnormalities
Talipes	18 per cent. of all major abnormalities
Meningocele	13 per cent. of all major abnormalities
Hydrocephalus	12 per cent. of all major abnormalities
Spina bifida	12 per cent. of all major abnormalities
Mongolism	8 per cent. of all major abnormalities
Cleft palate	3 per cent. of all major abnormalities
Hare lip	2 per cent. of all major abnormalities

due to malposition of a flail arm, there were false joints of almost all the long bones of the body of this infant The cause of this condition of dysgenesis ossium is not known It is fortunately seldom encountered The children in most cases die within a few weeks of birth as occurred in this instance Temporary splinting of the limbs with padded plaster of Paris pleases the parents, who feel that some treatment is being undertaken

Most fœtal abnormalities are described relative to structural deformity of one infant In the human subject it is usual for the woman to produce one child with each gestation The incidence of multiple pregnancies in Europe relative to single pregnancies is (Baird [39])

Twins	1 in 90 pregnancies
Triplets	1 in 8,000 pregnancies
Quadruplets	1 in 400,000 pregnancies
Quintuplets	Not stated

The largest number of children born to a woman at one delivery is considered to be seven as an authentic record The incidence of twin pregnancy in African women is approximately 1 in 70 births The rate is slightly higher than in Europeans Whereas in multiple pregnancies all the infants born may be perfectly normal, there is an important relationship between multiple pregnancies and fœtal abnormalities as seen in the case of conjoined twins The degree of union between the two such twins varies greatly in different cases Union along the abdomen is most usual, the junction occurring at the midthoracic position as seen in the illustration (Fig 145) of the Gambia conjoined twins described in 1940 (Bowesman [39]) The Kano conjoined twins operated upon by Aird [40] were similarly joined In some instances union may be by a fibrous mass between the sacrum of each twin with a covering skin union about the adjacent buttocks A sacral type of union is most often encountered in cases where the individuals have lived to adult life and walk side by side It is usual in conjoined twins to have individual autonomous nervous systems, the union between the twins may involve the surface of the bodies only, with a limited communication between the blood systems, but no union between the essential viscera It is in such cases that separation of the twins is most frequently possible If there is any union of essential structures such as the liver or the intestinal tract, much greater difficulty and danger is encountered in attempting to separate them The obvious necessity of adequate preliminary investigation with a view to determining which systems are or are not joined must be appreciated Intestinal X-ray examination following ingestion of barium or lipiodol should be undertaken Cholecystograms and uroselectan types of examination are also indicated before an attempt is made to separate the infants where there is union along the abdominal wall Patients joined buttock to buttock are less likely to such serious operative difficulties unless there is a union in the anogenital region as in the case of the Mysore twins reported by Rao [41] These female twins had a common anogenital opening for the two individuals Aird referred to the necessity of anæsthetising the two individual twins at operation, as, if the blood supply between the two twins is insufficient to carry the anæsthetic agent from one twin to the other in adequate dosage, the twin not anæsthetised by

reference to the cardiovascular system, the defects caused not being detectable *in utero* The possible relationship between tropical diseases and fœtal abnormalities is one which has so far received little attention, and it might be investigated with advantage

Although certain diseases are known to predispose to congenital defects the cause of many fœtal abnormalities is still quite unknown It has been observed personally that in a high proportion of cases of children born with a short leg, the shortness being usually in the femur, there has been in almost all cases a serious accident sustained by the mother, where she fell on the lower abdomen, between the sixth and the seventh month of pregnancy Fig 143 shows a child suffering from this condition The mother in this case had suffered from a serious lorry accident of this type



Fig 143
Child with congenital short leg associated with maternal injury during pregnancy

Certain abnormalities are known to have a hereditary tendency following either a dominant or a recessive trait In view of the risk of recurrence of abnormalities with successive births, in approximately 10 per cent of cases, antenatal patients might be tactfully asked if all their other children were born strong and healthy The matter broached in such terms is unlikely to upset them and this gives valuable information

On rare occasions an extraordinary œdematous fœtus is born which is termed hydrops fœtus This condition is associated with a Rhesus-negative mother who is producing a Rhesus-positive child by her husband who is Rhesus positive Hydrocephalus varies in degrees If the condition is marked it is usually not difficult to detect at full term If it is of mild degree only, spontaneous delivery generally occurs If the condition is marked before delivery obstructed labour develops and there is a high risk of uterine rupture If hydrocephalus is diagnosed before the thirty sixth week of pregnancy labour should be induced by insertion of a rubber tube into the uterus under aseptic conditions If the condition is diagnosed late it is advised that the fœtal skull be tapped through the uterine cervix with a lumbar puncture needle during labour The child being unhealthy will almost certainly, if born alive, not live more than a few weeks and delivery by Cæsarean section should be avoided if possible for the mother's sake who gains no advantage by such an operation and has a serious trauma inflicted on the uterus Following transcervical cerebral tapping spontaneous delivery usually occurs

A few cases of multiple pseudo-arthrosis have been encountered Fig 144 shows an X ray photograph of a case where some difficulty in delivery occurred

may not have been recognised and this gives a false impression of the possibility of delivery in spite of the union of the twins In the case of the Gambia conjoined twins personally seen, the mother, a tall Mandingo woman, had had three previous pregnancies all of which she described as ending in difficult labour She delivered the conjoined twins spontaneously in a country village at 5 30 A M aided by a qualified African midwife There was no transport available to take her to hospital There was no tear of the perineum with this delivery, though there may have been a tear with the previous births Labour lasted a total of fourteen hours One fœtal heart sound only was heard at her last antenatal visit and this did not arouse



FIG 145
The Gambia conjoined twins (Photograph used by kind permiss on of the Editor, *British Med cal Journal*)

suspicion as it should have done, although twins were diagnosed by the multiplicity of fœtal parts felt No fœtal heart was heard during labour and the children were born dead Permission for post-mortem examination was not given and it was only with some difficulty that the relatives were induced to give permission for the photograph to be taken

In the case of twin pregnancy where there is no union between the twins it is usually possible to hear two fœtal hearts which run at slightly different rates If an apparent twin pregnancy exists and two persons listen for the two fœtal hearts at different positions on the mother s abdominal wall using one watch for synchronising the period counted by each, over the same minute, a difference of *up to ten* beats per minute is usually noted if the twins are completely separate In the case of Siamese twins the hearts run at the same rate and it may be thought *that* only one heart is present as was noted in the Gambia case In most normal twin pregnancies one twin presents as a breech and the other as a vertex *If the*

mouth will be inadequately desensitised for operative purposes, also, when the two are divided, if one alone was anæsthetised, it would be necessary to give some anæsthetic to the twin now separated, and not receiving anæsthetic by mouth, for the repair of the surface defect which might take not less than half an hour A list of records of conjoined twins, often termed Siamese twins, is given in the



FIG 144
X ray photograph of infant with multiple congenital pseudo-arthrosis

extracts, which have been collected from various papers The list mentions only a very small fraction of the cases recorded and an even smaller proportion of cases that have actually occurred It is included to indicate that the condition is not altogether rare and may well be encountered at least once or twice in the professional lifetime of many doctors working in the tropics

In the case of Siamese twins, contrary to expectation, spontaneous delivery occurs in most cases It should be remembered, however, that in cases where obstructed labour has caused death of the mother the true nature of the obstruction

fœtal backs, or the *presence of two fœtal hearts running* at different rates, is diagnostic With any form of multiple pregnancy the uterus is unduly large for the estimated period of the gestation Premature labour occurs in about 70 per cent of cases of twin pregnancies and this is the most common complication of twin pregnancies Prematurity accounts for the high fœtal death rate relative to single pregnancy

One of the most important factors in the care of mothers with multiple pregnancies *is to insist on adequate rest during the latter two months of* pregnancy so that premature labour is not precipitated The high fœtal death rate in twin pregnancy corresponds to the degree of prematurity The risk of delivery of the second twin is slightly higher than the risk to the first twin Labour is of poor quality in over 50 per cent of the cases and should be anticipated Prolapse of the umbilical cord is not an uncommon complication of delivery of the second twin. Mechanical difficulty in delivery of twins such as "locked twins" is rare

The cause of death *in most premature infants is anoxæmia of some sort* This risk is greatly increased if an anæsthetic is given to the mother for instrumental delivery of the first or second twin Aaron and Halperin,[44] commenting on the fœtal survival rate in 376 twin deliveries, stresses the greatly increased risk of fœtal loss if general anæsthesia is administered to the mother for instrumental delivery

The respective rates of loss of one fœtus with the various anæsthetic agents was compared and the following results were noted

With general anæsthesia	14 per cent
With local anæsthesia	13 per cent
With low spinal anæsthesia	5 per cent

A small dose of heavy *spinal anæsthetic agent administered at a low level* gave the most satisfactory results for instrumental delivery in twin pregnancies

The term "prematurity" is used when referring to the duration of gestation relative to the normal period of pregnancy The term "immaturity" is used relative to the birth weight of the infant compared with the accepted normal of 2,500 gm for healthy babies when born at term Babies of 1,000 to 2,500 gm are considered to be immature Babies below 1,000 gm are considered to be not *viable* *The risk of fœtal* loss *is* greater in the second twin than the first twin Kurtz, Keating and Loftus,[45] considering a series of 500 deliveries, noted

Twin	Living	Neonatal Loss	Still birth	Antepartum Death
First	465	23	4	8
Second	437	47	6	10

The loss of the second twin is twice as common as loss of the first twin They found the first twin *was in 55 4 per cent* of cases below average standard weight at birth and that the second twin was below average standard weight at birth in 56 4 per cent of cases Delay in delivery of the second twin may account for

two fœtal heads can be detected close to each other in the same pole of the uterus the suspicion of conjoined twins should be aroused Shrewsbury[47] collected a large number of records of conjoined twins and fœtal monstrosities in humans and animals from the accounts found in early church records, medical and veterinary journals, and writings on medical history A list is prepared in the extract appended which is of interest Conjoined twins represent inadequate separation of the zygote at the early stage of a twin pregnancy developed from one ovum

Various types of incomplete division are represented by monstrosities—where partial division has occurred giving rise to individuals with two heads, two pairs of arms and one pair of legs, as in the case of the Mubende conjoined twins of Uganda reported by Nvule and Timmis[43] Monstrosities of this type may be suspected, if X-ray facilities are available, where two heads are seen close together and where six limbs can be identified in an apparent twin pregnancy, instead of eight Instances have occurred where there is one head, one pair of arms but two pairs of legs Rao[41] mentions two cases of a patient with a headless twin attached to the chest, one patient called A-Kee was from China and the other from India called La-lo If fœtal monstrosities are diagnosed it is advisable to induce labour not later than the thirty-sixth week If this is done the chance of spontaneous delivery is good, thus saving the mother the necessity of a Cæsarean section at term If a monstrosity is seen for the first time at full term it is considered advisable to undertake a classical Cæsarean section for the condition Although vaginal delivery may occur the risk must be considered higher than where Cæsarean section is undertaken If a trial labour is permitted and obstruction results then there may be considerable difficulty in extracting the child Realising *from experience the limited space available for removing an infant through a lower* segment Cæsarean section wound, it is considered that where a fœtus is thought likely to be grossly abnormal a well performed classical Cæsarean section is preferable to a lower segment type of operation for cases of this sort If an attempt is made to extract Siamese twins through a lower segment uterine incision there is a high risk of a lateral tear into the major uterine veins along the lateral part of the uterus Control of the hæmorrhage here is exceedingly difficult The classical type of operation under these circumstances is much safer

In some cases gross fœtal abnormality is due to cases of a teratoma attached to the fœtus The site of attachment is most often the sacrum or the chest wall These positions correspond to the common positions of attachment of Siamese twins A teratoma is considered to represent an immature conjoined twin which has died at an early stage of development It remains contained within, or attached to, the body of the fellow twin which has matured It is noted that invariably Siamese twins are of the same sex as essentially they must be by reason of the nature of their origin, being identical twins which have not separated adequately Fraternal twins are developed from the fertilisation of two ova, they are about five times as common as identical twins Uniovular twins are more likely to be associated with complications of pregnancy than binovular twins These *complications are hydramnios, eclampsia, placenta prævia and premature delivery*

The diagnosis of multiple pregnancies depends on the finding of multiple fœtal parts on palpation of the abdomen The presence of two fœtal heads or two

blocked by fallen trees, following a tropical storm. Ferries may not be operating due to swollen rivers and roads impassable due to flooding at a time when obstetrical help is a matter of urgency. The circumstances of each patient should be enquired into during the antenatal period and explicit instructions given so that unforeseen difficulties are not encountered in cases of difficult or obstructed labour. It is a great pity to carry out many antenatal examinations and finally find that at the time of labour the patient is separated from the hospital by a broken-down bridge.

Patients in early labour stand a journey by car very well so long as the membranes have not ruptured. If they are transported at a late stage in labour after the membranes have ruptured, the excessive jolting by car is not devoid of risk. Where severe obstetrical obstruction exists rupture of the uterus may occur. The urgency of the situation may predispose to unduly fast or careless driving on the part of the driver in his efforts to be helpful. Transport of a patient in labour by canoe from one river town to another may be smooth while the going is good, but if delivery occurs while the patient is in such a narrow boat attempts to render assistance are very difficult and dangerous. This was noted at one station where the hospital was placed on an island in a large river in West Africa.

The position is constantly arising of expatriate women living in the tropics who when they become pregnant frequently express the wish to return to their relatives overseas in other parts of the world for delivery of the child. They wish however, to remain as long as possible in their homes in the tropics with their husbands. The matter of the place of the delivery should be decided upon as soon as the woman is definitely known to be pregnant, so that adequate preparations can be made for her transfer. It often takes several weeks or months to make shipping or air passage arrangements. Much inconvenience is caused to the doctor and the patient and her husband if plans have to be altered. Whereas the risk of delivery is now not higher in some of the large tropical centres than in most centres in non tropical countries, no credit is gained if any form of misadventure occurs to the woman or her child, even though it might equally well have occurred in a non tropical country. For many reasons it is desirable that children should be born in the country of which their parents are nationals.

Some shipping companies are not willing to carry pregnant women who have passed beyond the sixth month of pregnancy and this should be remembered when making preliminary travelling arrangements. The morning sickness of pregnancy may be much aggravated by superimposed sea sickness. The optimum time for pregnant women to travel by sea, if this is essential, is between the fourth and the sixth months. Air travel during pregnancy is also best undertaken between the fourth and the sixth months. Air travel seldom upsets pregnant women but the air companies may not be willing to accept such passengers after the sixth month of pregnancy. There is a small risk of air travel in African patients if they suffer from a sickle cell trait. A crisis is a recognised risk if there is a fall in the oxygen tension at high altitudes. This risk is, however, minimised as most modern ... are pressurised to normal atmospheric conditions. Some aircraft have ... known ... ned

the higher loss with the second twin If the pregnancy is of the fraternal type with two amniotic cavities present, it is advised that after the birth of the first child the membranes of the amniotic sac of the second should be punctured if they are not already ruptured, and that 0 125 c c of pitocin be given intramuscularly in order to expedite the birth of the second twin as the uterine cervix is already dilated by the delivery of the first twin



Fig 146
Infant with marked exomphalos

TRANSPORT IN ANTENATAL CASES

It is considered desirable to include some comments on the transport of pregnant women in the tropics The limited medical services in most parts of the tropical world makes it desirable for pregnant women to make adequate arrangements during the antenatal period for their delivery at a centre where reasonable facilities are available should obstetrical aid be required Most women like if at all possible, to be amongst their close relatives at the time of the birth of their children Whereas it is desirable for primiparæ to enter hospital for the delivery of their first child, multiparæ should certainly make arrangements, giving adequate notice to the local midwife, for delivery at home

The lack of freely available transport, and the poor quality of the smaller roads in many places, makes transfer of cases actually in labour most undesirable Patients should certainly be not more than two hours' journey away from hospital where they can receive obstetrical help in the event of this becoming necessary If they are more than two hours travelling distance away from the hospital to which they intend to go for delivery, they should temporarily transfer their place of residence closer to the hospital centre This should be done not less than one week before the expected date of delivery If this is not done the patient may be held up at the last minute by lack of transport The roads are obstructed, being

blocked by fallen trees, following a tropical storm. Ferries may not be operating due to swollen rivers and roads impassable due to flooding at a time when obstetrical help is a matter of urgency. The circumstances of each patient should be enquired into during the antenatal period and explicit instructions given so that unforeseen difficulties are not encountered in cases of difficult or obstructed labour. It is a great pity to carry out many antenatal examinations and finally find that at the time of labour the patient is separated from the hospital by a broken-down bridge.

Patients in early labour stand a journey by car very well so long as the membranes have not ruptured. If they are transported at a late stage in labour after the membranes have ruptured, the excessive jolting by car is not devoid of risk. Where severe obstetrical obstruction exists rupture of the uterus may occur. The urgency of the situation may predispose to unduly fast or careless driving on the part of the driver in his efforts to be helpful. Transport of a patient in labour by canoe from one river town to another may be smooth while the going is good, but if delivery occurs while the patient is in such a narrow boat attempts to render assistance are very difficult and dangerous. This was noted at one station where the hospital was placed on an island in a large river in West Africa.

The position is constantly arising of expatriate women living in the tropics who when they become pregnant frequently express the wish to return to their relatives overseas in other parts of the world for delivery of the child. They wish, however, to remain as long as possible in their homes in the tropics with their husbands. The matter of the place of the delivery should be decided upon as soon as the woman is definitely known to be pregnant, so that adequate preparations can be made for her transfer. It often takes several weeks or months to make shipping or air passage arrangements. Much inconvenience is caused to the doctor and the patient and her husband if plans have to be altered. Whereas the risk of delivery is now not higher in some of the large tropical centres than in most centres in non tropical countries, no credit is gained if any form of misadventure occurs to the woman or her child, even though it might equally well have occurred in a non-tropical country. For many reasons it is desirable that children should be born in the country of which their parents are nationals.

Some shipping companies are not willing to carry pregnant women who have passed beyond the sixth month of pregnancy and this should be remembered when making preliminary travelling arrangements. The morning sickness of pregnancy may be much aggravated by superimposed sea sickness. The optimum time for pregnant women to travel by sea, if this is essential, is between the fourth and the sixth months. Air travel during pregnancy is also best undertaken between the fourth and the sixth months. Air travel seldom upsets pregnant women, but the air companies may not be willing to accept such passengers after the sixth month of pregnancy. There is a small risk of air travel in African patients if they suffer from a sickle cell trait. A crisis is a recognised risk if there is a fall in the oxygen tension at high altitudes. This risk is, however, minimised as most modern aircraft are pressurised to normal atmospheric conditions. Some aircraft have
known
ied

of the advantage of the oxygen provided rather than the risk of its absence. She cannot be expected to appreciate the risk of deficiency of oxygen in her condition

Antenatal patients constantly have to be transferred to hospital already in labour Many are brought to hospital in late obstructed labour who have not previously received treatment or attention in the antenatal clinic In country stations a dilemma often arises where the doctor, with limited experience and poor facilities available, may have to make a choice between the possible courses of action open to him either of which is unfavourable He must decide whether to deal with the case of difficult or obstructed labour himself or have it transferred to one of the larger centres where there is a specialised obstetrical unit In view of the high incidence of obstructed labour in the tropics no doctor should be considered adequately equipped to take charge of a " one man " station unless he is capable of dealing with obstructed labour by forceps delivery, Cæsarean section and symphysiotomy Cæsarean section is not necessary in all cases of obstructed labour, but it is sometimes the only possible method of dealing with a difficult case, and so a knowledge of its technique is essential The matter of obstructed labour will be dealt with in detail in a later chapter It can be said here, relative to the transport of cases, that if a patient arrives in labour of less than twenty-four hours, the likelihood of her having a normal delivery, a difficult labour or an obstructed labour must be decided immediately The pelvic measurements, the position of the child and the normality or otherwise of the soft tissues must be considered If delivery of the child is not likely to occur within the normal time from the onset of labour (twenty-four hours) the doctor must be prepared to deal with the case himself or transfer it to the larger centre immediately It is unfair to transfer late or moribund cases of childbirth to the main station, having by delay taken away the woman's only chance of survival Whereas doctors are encouraged to deal with cases of difficult labour from their own district, it may, in exceptional cases, be permissible to transfer cases seen between the twenty-fourth and thirty-sixth hour of labour Rupture of the uterus is not common under thirty-six hours, though it may occur earlier If the patient is in labour for thirty-six hours or more it is considered undesirable to transfer her to the large centre She should be dealt with locally when seen without further delay, as in these cases Cæsarean section or symphysiotomy is invariably necessary and no adverse criticism can reasonably be made in such severely obstructed cases if section is undertaken If it is decided to transfer a case of difficult labour between the twenty-fourth and the thirty-sixth hour of labour the hospital should be notified of the anticipated time of arrival, using telephone if available, otherwise the fastest available messenger, giving details of the nature of the case By so doing the theatre can be made ready while the patient is travelling and so be immediately available on arrival of the case In this way further delay may be avoided and the time used for the transfer of the patient be usefully employed in making the necessary theatre preparations It is an advantage [illegible]

the transfer by ambulance is just sufficient, by the movement involved, to expedite

delivery in some cases of difficult labour The patient's bladder should be emptied by catheter before the journey is started

In view of the fact that there is a marked rise in morbidity and sepsis in patients who are in labour over twenty-four hours, it is wise to anticipate this by giving at least one dose of penicillin before transferring the patient A mild sedative such as 50 mg of pethidine with 2 c c of coramine can be given without danger and they improve the patient's condition All cases should be accompanied by a letter of introduction on transfer giving as much information as possible and the nature of preliminary treatment given

PSYCHOPROPHYLAXIS FOR LABOUR

Any method of management which shortens the duration of labour by safe means is worthy of consideration In this respect conspicuous advantage is gained by the patient being mentally conditioned for the process of delivery There is little doubt whatever that the intensity of the pain experienced by any form of trauma is greatly increased by fear and apprehension A typical "fear pain" relationship is exhibited in a high proportion of persons undergoing dental treatment Restiveness and contortions frequently commence before any manipulation is undertaken and must be explained on grounds of fear alone Others who have learned to dissociate their minds from the immediate manipulations which are being undertaken experience remarkably little discomfort Having personally learned this method as a child no difficulty is experienced at all by minor surgery or dental treatment being undertaken

The process of labour is an inescapable phase in the process of normal childbirth Nature's hormonal provision greatly assists the woman to bear the discomforts of labour by the anticipation of the pleasure which delivery of her child will afford It is remarkable to note that during the past thirty years statistics suggest that there has been a steady decrease in the average duration of labour amongst primiparæ in Britain Macafee,[46] commenting on the decreased duration of labour in recent years, presumed that it was due to the more enlightened and intelligent outlook of the modern young woman on the subjects of the anatomy and physiology of labour The "average time of delivery" for primiparæ and multiparæ was noted from the onset of labour to the delivery of the placenta in hospital practice with the following results

Date	Primiparæ	Multiparæ
1938	27 hours 50 minutes	11 hours 4 minutes
1939	22 hours 20 minutes	9 hours 37 minutes
1940	22 hours 26 minutes	10 hours 57 minutes
1954	16 hours 52 minutes	10 hours 45 minutes

It is noticeable that the time of labour has conspicuously decreased in primiparæ whereas it has only slightly decreased in multiparæ It is thought that the previous experience of parturition in multiparæ contributed to the decrease in labour time with the second pregnancy apart from the factor of the relaxation of soft tissues due to the birth of the previous infant The method of

of the advantage of the oxygen provided rather than the risk of its absence She cannot be expected to appreciate the risk of deficiency of oxygen in her condition

Antenatal patients constantly have to be transferred to hospital already in labour Many are brought to hospital in late obstructed labour who have not previously received treatment or attention in the antenatal clinic In country stations a dilemma often arises where the doctor, with limited experience and poor facilities available, may have to make a choice between the possible courses of action open to him either of which is unfavourable He must decide whether to deal with the case of difficult or obstructed labour himself or have it transferred to one of the larger centres where there is a specialised obstetrical unit In view of the high incidence of obstructed labour in the tropics no doctor should be considered adequately equipped to take charge of a ' one man ' station unless he is capable of dealing with obstructed labour by forceps delivery, Cæsarean section and symphysiotomy Cæsarean section is not necessary in all cases of obstructed labour, but it is sometimes the only possible method of dealing with a difficult case, and so a knowledge of its technique is essential The matter of obstructed labour will be dealt with in detail in a later chapter It can be said here, relative to the transport of cases, that if a patient arrives in labour of less than twenty four hours, the likelihood of her having a normal delivery, a difficult labour or an obstructed labour must be decided immediately The pelvic measurements, the position of the child and the normality or otherwise of the soft tissues must be considered If delivery of the child is not likely to occur within the normal time from the onset of labour (twenty-four hours) the doctor must be prepared to deal with the case himself or transfer it to the larger centre immediately It is unfair to transfer late or moribund cases of childbirth to the main station, having by delay taken away the woman's only chance of survival Whereas doctors are encouraged to deal with cases of difficult labour from their own district, it may, in exceptional cases, be permissible to transfer cases seen between the twenty-fourth and thirty sixth hour of labour Rupture of the uterus is not common under thirty six hours, though it may occur earlier If the patient is in labour for thirty-six hours or more it is considered undesirable to transfer her to the large centre She should be dealt with locally when seen without further delay, as in these cases Cæsarean section or symphysiotomy is invariably necessary and no adverse criticism can reasonably be made in such severely obstructed cases if section is undertaken If it is decided to transfer a case of difficult labour between the twenty fourth and the thirty-sixth hour of labour the hospital should be notified of the anticipated time of arrival, using telephone if available, otherwise the fastest available messenger, giving details of the nature of the case By so doing the theatre can be made ready while the patient is travelling and so be immediately available on arrival of the case In this way further delay may be avoided and the time used for the transfer of the patient be usefully employed in making the necessary theatre preparations It is an advantage if the doctor can accompany the case, failing this a qualified midwife should certainly be in attendance lest the infant be born unexpectedly during transit In quite a high proportion of cases the transfer by ambulance is just sufficient, by the movement involved, to expedite

The advantages claimed are decrease in pain is apparent, the duration of labour is shorter than in control series, being of two-thirds duration only, blood loss smaller where psychoprophylaxis was used

Blood loss *with* psychoprophylaxis was

Primiparæ, 119 1 c c, multiparæ, 114 8 c c

Blood loss *without* psychoprophylaxis was

Primiparæ, 165 c c, multiparæ, 170 5 c c

In tropical obstetrical practice there is little time available for work other than essential duties in many instances Patients are most likely to ask questions and be helped by a capable sister of the maternity department who could give adequate instruction It is necessary to have only two, or at most four, lectures It is likely that at least one lecture per week could be arranged, which antenatal patients close to term could attend with advantage The majority of intelligent women carry through normal labour with limited sedation and are not unduly distressed Psychoprophylaxis may help considerably in reducing the duration and discomforts of normal labour Where this method is inadequate for childbirth some form of anæsthesia may be considered

EXTRACTS

1 List

1939 Lima, Peru Mother, aged 5 years 8 months Photograph given by Dr Lozada attending Cæsarean section Ref "La plus jeune Mere de la Monde" E Escomel *Presse med* 1939 47 (i), 875 (This appears to be the world s record)

1939 Prague, Czechoslovakia Mother, aged 6 years 9 months Case of Dr Chaschinski Ref "Pregnancy in Children' H Vignes & R Hamelin *Presse med* 1939, 47 (ii) 1257

1932 Delhi, India Mother, aged 7 years Case of Dr Hilda L Keane Cæsarean section Ref "A Case of Maternity at Seven Years of Age" *Brit med J* 1933, 2 567

1759 Switzerland Mother, aged 8 years Case of Dr Haller Ref 'Annotations The Editor, *Lancet*, 1898, 1, 1131

1878 Oberpallen Belgium Child, aged 8 years Case of Dr M Lefebvre presented before Belgian Academy of Medicine Ref *Med Tms Gaz* 1878, 1, 276 Also reported in Belgian journals

1936 San Zenon, Peru Mother, aged 8 years 2 months Case of Dr Manjarres Delivery normal Ref 'Maternites Extraordinarement Precoces' J Comby *Arch Med Enf* 1938, 41, 806

1877 Luxemburg Mother, aged 8 years 3 months Case of Dr Mollitor Ref Editor s note in *Lancet*, 1898, 1, 1131

1825 Germany Mother, aged 9 years Case of Dr Outrepont Ref 'Annotations *Lancet*, 1898, 1, 1131

1881 Yorkshire, England Mother, aged 9 years 8 months Case of Dr Dodds Ref 'Annotations" The Editor, *Lancet*, *1898*, *1*, *1131*

1958 Maidstone, England Mother, aged 11 years Case of Dr A D Ledward Ref Personal communication

1947 Swansea, Wales Mother, aged 11 years 6 months Case of Dr J R E James Ref "A Young Primigravida" *J Obstet Gynaec Brit Emp* 1952, 59 363

psychoprophylaxis makes use of the advantage of education in the process of labour In the modern life of large cities where there is increasing knowledge of the process of childbirth due to literature on the subject being freely available to the public, the duration of labour in town dwellers is shorter than in rural populations The method of psychoprophylaxis has not been employed as a routine in British hospitals though psychoprophylaxis or modifications of it are undertaken in some private clinics (Dick Read) There is, however, a vast increase in the use of this method on the continent of Europe

If the incidence of complications of labour is investigated relative to the time factor in the process of labour, it will be noted that there is a steep incline in all complications where labour lasts more than twenty-four hours It is, therefore, considered that an advantage is gained by shortening the duration of labour by educational methods in women whose pregnancy appears to be within normal limits and in whom pelvic measurements are considered adequate for normal delivery The term "psychoprophylaxis" has been used for the system of training of pregnant women for the course of labour The method is popular on the continent of Europe in some of the large centres Lausanne in Switzerland, Lyons in France and Moscow in the U S S R Arnoldova [47] compared two large series of cases both of over 500 patients in each group In one group psychoprophylaxis was used while in the other no training was received by the patients The conclusions reached on analysing the type of labour experienced in the different groups was that with psychoprophylactic training the labour was shorter and easier and associated with less complications than in the group who did not receive training by this method Ch'en Wen-Chen,[48] working in China, also observed a large series of cases, 8,063 deliveries being noted in which the methods of Platonov, Volvoski, Plotitcheol and Schugom were used Briefly the method consisted of

1 Two antenatal lectures during the week before delivery Anatomy and physiology of labour were discussed with encouragement and reassurance to the patient
2 Controlled breathing exercises are important to improve oxygenation and co-ordination during labour
3 Patients are encouraged to talk and ask questions to dispel ignorance about the process of delivery
4 Patients are shown the wards before the onset of labour, including the labour ward
5 They are encouraged to practise mental dissociation, this discourages inco-ordination, unnecessary straining, loss of strength and inadequate oxygenation

It was considered that 94 per cent of Chinese patients were benefited from the method

A small proportion of patients were considered unsuitable for the method, being either mentally retarded or defective Classification of the results is as follows

(a) Excellent result, 15 per cent
(b) Good result, 37 8 per cent
(c) Fair result, 41 per cent
(d) Failed, 5 6 per cent

Comparison of Sensitivity of Pregnancy Tests Toad *Bufo-bufo asiaticus* used in China

Test Animals	I U G T	Male Toad	Male Frog	Female Mice
Weight of animals		29 to 43 gm	32 to 52 gm	6 to 8 gm.
	5 units	*5 per cent*	*16 6 per cent*	*15 per cent.*
International units injected	10 units	25 per cent	59 1 per cent	70 per cent
	15 units	*86 per cent*	66 7 per cent	85 per cent.
Percentage positive results	*20 units*	*99 per cent*	*83 3 per cent*	*90 per cent*

Performance of test —*Take 16 c c* urine, inject 4 c c into each of two male toads Balance *8 c c left over Dilute up to 16 c c again—now half strength* Again inject two male toads 4 c c and carry out further test *etc*, *each dilution half* the previous strength Continue test until male toads do not react by sperm emission Note dilution of last positive Toad tests should be read at three and twenty four hours

The amount of gonadotropin necessary to produce a sperm reaction in a toad is 15 to [illegible] inter[illegible] The [illegible]erage is taker[illegible] [illegible] he la t positive reaction and conversely the number of units of gonadotropin which would be in 1 c c of the urine *injected If* the number of gonadotropic units per cubic centimetre of urine injected reaches or exceeds 280 it is considered that the patient is certainly suffering from hydatidiform mole or presumably, chorion epithelioma

Dilution Number	Equivalent of Urine injected per Animal	*I U G T* per Cubic Centimetre Urine as shown by Sperm Reaction
	c c	
1	4·0	4 4
2	2 0	8 8
3	1 0	17 5
4	0 5	35 0
5	0 25	70 0
6	0 125	140 0
7	*0 0625*	280 0
8	0 03125	560·0
9	0 015625	1120 0
10	0·0078125	2240 0

1 to 6 are dilutions which suggest normal pregnancy
7 and excess suggest abnormal pregnancy—hydatidiform mole and chorion epithelioma

5 Outlet of the Indian Female Pelvis N C Sen (Bengal) *J Obstet Gynaec India* 1956 6 345

Average measurements of the Indian female pelvis

Observations

Subpubic angle	84 4 degrees
Intertuberous distance	10 92 cm
Posterior sagittal distance	8·75 cm
Internal conjugate distance	10 93 cm
Outlet area measurement	94 54 sq cm

Classification of subpubic angle

Gynæcoid	38 4 per cent women	Subpubic angle	85 3 degrees
Android	13 2 per cent women	Subpubic angle	80 0 degrees
Platypelloid	6 6 per cent women	*Subpubic angle*	88 8 degrees
Anthropoid	*11 8 per cent*, women	Subpubic angle	79 0 degrees
Mixed types	30 0 per cent women	Subpubic angle	*85 6 degrees*

1956 Ho Ghana Four mothers all aged 12 years Cases of Dr Y Asinfi Personal communicat on during visit to Ho Hosp tal Delivery by Cæsarean section
1955 Milwaukee U S.A Mother aged 12 years Case of Drs F J Hofme ster & G F Burgess Ref Labour in Young and Old Primiparas *Obstet and Gynec* 1955 6 162
1951 Los Angeles U S A Three mothers all aged 12 years attended by Dr C V Van der Ahe Ref Pregnancy in Young Girls *West J Surg* 1951 59 235
1950 Washington U S A Three mothers all aged 12 years attended by Drs A A. Marchette & J S Menaker Ref Pregnancy and the Adolescent *Amer J Obstet Gynec* 1950 59 1013
1952 Cape Town South Afr ca Mother aged 12 years Case of Dr R St C Sinclair Ref Pregnancy and Labour in Young Mother *J Obstet Gynaec Brit Emp* 1952 59 504
1898 Indianapolis U S A Mother 12 years 10 months Case of Dr W Christian Normal delivery Ref Precocious Pregnancy *J Amer med Ass* 1898 31 138

2 Voge s Chemical Test for Pregnancy C I B Voge *Br t med J* 1929 2 829

A colour test us ng bromine water It is a test for histidine which is excreted in the urine in pregnancy

Take 2 5 c c of pat ent s urine
Add 1 c c of bromine water
D lut to double this volume with water *e g* 3 5 c c plus 3 5 c c to 7 c c Bring to bo ling po nt

Result —If posit ve for pregnancy a pale p nk colour develops which rap dly fades A strong p nk colour should not be expected If negative slight yello v colour of solution is ma ntained

Results correspond very accurately with Zondek Aschheim tests
The test being very simple may be useful in country stations Bromine water alone is needed

3 Richardson s Colour Test for Pr gnancy G C Richardson *Amer J Obstet Gynec* 1951 61 1317

A colour test using sodium hydrox de sulphuric acid and dinitrophenol hydrazine

Take 2 c c of patient s urine
Add 2 drops of 0 5 normal NaOH Shake up
Add 2 c c. chloroform shake up and allow to settle into two layers

P pette off the upper layer to this pipetted-off fluid add 4 drops solution of 0 5 normal sulphur c ac d Shake up

Add 5 drops of saturated 2 4 din trophenol hydrazine
Add 2 c c of 0 5 normal NaOH

Result —If brown colour occurs and lasts two minutes or more test pos t ve If brown colour appears and fades immediately test negative

4 A Study of 128 cases of Hydatidiform Mole with special reference to Quantitative D lution Toad Test T ien Shueh P ing Ch en Mei P u & Liu Ti Lin *Ch nese Med cal Jo rnal* 1956 74 258

preg
dete

S gns in diagnosis

(1) Undue enlargement of uterus for duration of pregnancy plus bleeding per vag nam (52 34 per cent)
(2) Hæmoptysis in 14 6 per cent of the cases
(3) Expuls on of vesicles per vaginam
(4) Absence of fœtal parts in X ray after the fourth month of pregnancy
(5) Absence of fœtal heart sounds at fifth month

Male toads requ re on an average 20 international units of gonadotrop n for pos tive test

8 Some cases of conjoined twins reported in the literature are given to indicate that the condition is not unduly rare. Original records as here given have all been traced. Many of the older writings are not easily available. *Reference to well-known ancient cases are brought forward from one journal to another, as shown below.* Over 100 cases have been recorded in medical literature.

Conjoined Twins	Reported by	Reference	Birthplace
1958	Stugglebout, W	*Brit med J* 2, 727	Kaduna, Nigeria
1958	Franklin, A W	*Lancet*, 2, 683	London, England
1957	Misra, S	*J Obstet Gynaec India*, 7, 214	Calcutta, India
1955	Rao, P K	*Indian J med Sci* 9, 780	Mysore, India
1955	Nvule & Timmis, W G	*E Afr med J* 32, 177	Mubende, Uganda
1955	Wijthoff, J P S	*Nederl Tijdschr Geneesk* 99, 3604	Friesland, Holland
1954	Feeney, J K & Devlin, J G	*Irish J med Sci* p 274	Dublin, Eire
1954	Aird, I	*Brit med J* 1, 831	Kano, Nigeria
1954	Foulkes, J F	Personal communication	Hastings, England
1953	Walker, N , *et al*	*S Afr med J* 27 (ii), 1110	Shabanie, S Rhodesia
1953	Grossman, H J , *et al*	*J Amer med Ass* 153 (i), 201	Illinois, U S A
1952	Xavier, Y B & Constantino, J	*Ann Brazil Gynæc* 34, 223	Brazil, S America
1952	Reitman, H , *et al*	*J Amer med Ass* 153 (ii), 1360	Cleveland, U S A
1953	Vilhena, R	*Rev Brazil Hist Med* 3, 91	Brazil, S America
1951	Tibbit, L R	*S Afr med J* 25 (i), 17	Edendale, S Africa
1948	Jones, S H , *et al*	*J Amer med Ass* 138, 642	Boston, U S A
1946	Roxburgh, A N	*Brit med J* 1, 572	Caithness, Scotland
1940	Bowesman, C	*Brit med J* 1, 436	S Kombo, Gambia
1936	Holm, H H	*Minnesota Med* 19, 740	Minnesota, U S A
1936	McLaren, D W	*Brit med J* 2, 971	Sokoto, Nigeria
1929	Bland Sutton, J	*Brit med J* 1, 1	London, England
1929	Bland Sutton, J	*Brit med J* 1, 1	Siam (1811 74)
1928	Patrick, C. V	*Lancet*, 1, 282	London, England
1928	Cameron, H C	*Lancet*, 1, 284	London, England
1911	Rooth, J A	*Brit med J* 2, 653	Brighton, England
1911	Rooth, J A	*Brit med J* 2, 653 (ref)	Prague, Bohemia
1910	Riggal, R M	*Brit med J* 1, 1050	Samar, Philippines

Many other references have been noted, but the original records have not been found. The following further cases are famous in medical history:

"The Biddenden Maids," 1100-34
"The Florentine Twins," 1400
"The Scottish Brothers," 1400
"The Sisters of Viaban," 1500
"The Sisters of Middleton," 1554
"The Russel Twins of Cambridge," 1598
"The Twins of Coleredo, Genoa," 1617
"The Hungarian Sisters," 1701 23
"Lalo, the Hindu Boy," 1804
"The African Sisters," 1851 84
"The Hindu Sisters," 1900-38
"The Sardinian Sisters," 1929

The "*Biddenden Maids*" *still remain* the village sign in Biddenden village in Kent, England, as noted during a recent visit, 1958

Alternative classification of subpubic angle

Wide	96 0 degrees	(14 per cent of women)
Moderate	85 2 degrees	(55 per cent of women)
Narrow	77 58 degrees	(31 per cent of women)

as it is accompanied by an adequate internal conjugate measurement It is, therefore, *essential*

6 " Measurement of Chinese Female Pelvis Ko Ying Kuei *Chin med J* 1957, 75 656

MEASUREMENTS

Average inlet	
Interiliac spinous	25 2 cm (10 in)
Intercrestal	28 4 cm (11 in)
External conjugate	20 5 cm (8 15 in)
Average mid pelvis	
Internal conjugate	11 5 cm (4 6 in)
Interischial spinous	10 0 cm (4 in)
Average outlet	
Diagonal conjugate	12 3 cm (4 9 in)
Post sagittal	9 3 cm (3 75 in)
Intertuberous	9 0 cm (3 64 in)
Height of pubis	5 5 to 7 5 cm (2 25 to 3 05 in)
Average pubic height	6 5 cm (2 65 in)
Subpubic angle measured clinically	60 to 112 degrees (average 84 2 degrees)
Subpubic angle measured radiologically	66 to 109 degrees (average 87 6 degrees)

7 Pelvic Measurements (British) Dugald Baird *Combined Textbook of Obstetrics and Gynæcology* pp 354 to 370 E & S Livingstone, Edinburgh (1957)

Round pelvis (gynæcoid)	
Internal conjugate	4·9 in (12 2 cm)
Transverse diameter	5 4 in (13 5 cm)
Interischial spines	4 5 in (11 2 cm)
Subpubic angle	89 degrees
Round pelvis with contracted outlet	
Internal conjugate	5 2 in (13 cm)
Transverse diameter	5 3 in (13 2 cm)
Interischial spines	3 5 in (8 9 cm)
Subpubic angle	52 degrees
Flat pelvis (platypelloid)	
Internal conjugate	3 2 in (8 0 cm)
Transverse diameter	4 8 in (12 cm)
Interischial spines	4 1 in (10 2 cm)
Subpubic angle	102 degrees

BOWESMAN, R (1959) Personal communication Induction of labour by rupture of the membranes
HEELAN, F (1957) Personal communication on symphysiotomy Ghana
COFFEY, V P & JESSOP, W J (1955) Congenital abnormalities *Irish J med Sci* p 30
BAIRD, D (1957) *Combined Textbook of Obstetrics and Gynæcology*, 6th ed, p 354 Edinburgh Livingstone
BOWESMAN, C. (1940) Siamese twins *Brit med J* 1, 436
AIRD, I (1954) The conjoined twins of Kano *Brit med J* 1, 831
RAO, P K (1955) The Mysore Siamese twins *Indian J med Sci* 9, 780
SHREWSBURY, J F D (1953) Material for a history of monstrous and multiple births *J Obstet Gynæc Brit Emp* 60, 417
NVULE & TIMMIS, W G (1955) The Mubende conjoined twins *E Afr med J* 32, 177
AARON, J B & HALPERIN (1955) Fetal survival in 376 twin deliveries *Amer J Obstet Gynec* 69, 794
KURTZ, G R, KEATING, W J & LOFTUS, J B (1955) Twin pregnancy and delivery, analysis of 500 cases *Obstet and Gynæc* 6, 370
MACAFEE, C H G (1957) The changing face of obstetric practice and teaching *Cent Afr J Med* 3, 37
ARNOLDOVA, A M (1957) Effect of psychoprophylactic training in pregnancy on the course of labour *Akus i Ginek* 6, 30
CH'EN WEN CHEN (1957) Clinical analysis of 8,063 cases of painless labour by psychoprophylactic method *Chin med J* 75, 337

REFERENCES

1 Asirifi Y (1957) Personal communication Ghana W Africa
2 Beard H H & Terrell T C (1955) A biochemical test for chorionic gonadotrop n *Sth med J (Bgham Ala)* 48 1352
3 Richardson G C (1951) A new biochemical test for pregnancy *Amer J Obstet Gynec* 61 1317
4 Voge C I B (1929) A simple chemical test for pregnancy *Brit med J* 2 829
5 Hechter O Lev M & Soskins S (1940) The relat on of hyperæmia to the action of estrin *Endocrinology* 26 73
6 T ien Shueh P ing Ch en Mei P u & Liu Ti Lin (1956) A study of 128 cases of hydatidiform mole with special reference to quantitative dilution toad test *Ch n med J* 74 258
7 Wahi P N (1956) Evaluation of pregnancy tests *J Obstet Gynaec Ind a* 7 35
8 Khalequé K A (1956) Pregnancy test on the male toad *Bufo melanost ctus* at Decca *J trop Med Hyg* 59 78
9 Hou P C & Pang S C (1956) Chorion ep thelioma *J Path Bact* 72 95
10 Acosta Sison H A (1957) Hydatidiform mole and chorion ep thelioma in the Orient *J Ph l pp med Ass* 33 667
11 Acosta Sison H A (1957) Eleven cases of chorion ep thelioma with 100 per cent mortality *J Ph ll p med Ass* 33 814
12 Drury M I (1954) Anæmia of pregnancy *Irish J med Sci* p 172
13 Tien S P, Chen M P & Hua Y (1950) Pregnancy test with male toad in Shangha *Ch n med J* 68 346
14 Rao K B (1952) Malaria complicating pregnancy *J Obstet Gynaec Ind a* 2 209
15 Jordan P (1954) Bancroftian microfilariæmia in hospital in patients *J trop Med Hyg* 57 8
16 Harris F C (1953) Vitamin K in prevention of neonatal hæmorrhage in the Gold Coast Afr can *W Afr med J* 2 129
17 Barry A P (1953) Hydramnios *Ir sh J med Sci* p 257
18 Barry A P (1955) Largact l in midwifery *Ir h J med Sci* p 412
19 Patil H B (1953) Chorion carcinoma *Ind an J med Sci* 7 1
20 Madden S (1950) Chorion epithelioma in Fallopian tube *J Ob tet Gynaec Br t E p* 57 68
21 Winckel W A (1953) Histoplasma findings in menstrual disturbances *Doc n Med geogr trop (Am t)* 5 215
22 Francis O (1953) Certain aspects of cephalopelvic d sproportion *J Obstet Gynaec Ind a* 3 225
23 Jhirad J (1953) Review of cases of d sproportion *J Obstet Gynaec Ind a* 3 123
24 Sen N C (1953) B rth we ght and head d mens ons of Ind an bab es *J Obstet Gynaec Ind a* 3 233
25 Kerr J Munro & Moir J C (1949) *Textbook of Operat ve Obstetrics* 5th ed London Ba llere Tindall & Cox
26 Sen N C (1953) A report on the Ind an female pelv s *J Obstet Gynaec Ind a* 3 172
27 Sen N C (1956) Outlet of the Indian female pelvis *J Obstet Gynaec Ind a* 6 345
28 Ko Ying Kuei (1957) Measurements of Chinese female pelvis *Ch n med J* 75, 656
29 Remmelts R (1950) Obstetrics in Indonesia *Docum neerl indones Morb trop* 2 235
30 Baird D (1957) *Comb ned Textbook of Obstetr cs and Gynæcology* 6th ed pp 354 370 Ed nburgh L vingstone
31 Morris W I C (1948) Obstetrical evaluat on of the pubic arch *Lancet* 2 139
32 Green Armytage V B (1958) Section on trop cal diseases of pregnancy p 506 *Brit sh Obstetr c and Gynæcolog cal Pract ce* Vol I ed Holland E & Bourne A London He nemann
33 Heyns O S (1946) The superiority of the South Afr can negro of Bantu as a parturient *J Obs Gynæc Br t Emp* 53 405
34 Holland E & Bourne A (1955) *Brit h Ob tetric and Gynæcolog cal Practice* p 546 London Heinemann

greater proportions and relative importance in tropical surgery than in surgery in non-tropical parts of the world

There are many ways in which ectopic pregnancy might be classified, but in a book on clinical work it is convenient and desirable to present a classification which represents the five different ways in which ectopic pregnancies may come to the doctor's notice

1 Unruptured tubal pregnancy
2 Ruptured tubal pregnancy with massive internal hæmorrhage
3 Tubal abortion with slow internal hæmorrhage
4 Primary abdominal pregnancy
5 Late ectopic pregnancy with sinus formation

In many instances the history given by the patient and physical examination of the case is sufficient to establish beyond doubt that an ectopic pregnancy is present Ultimately the diagnosis depends on a combination of some of the five determining factors establishing the fact that a live pregnancy is present somewhere in the abdomen, the finding of a palpable abnormality within the abdomen which is not within the uterine cavity, evidence of signs of internal hæmorrhage, the presence of fœtal bones as seen by X-ray examination in advanced cases which are within the abdomen but not in the uterine cavity, or the presence of fœtal bones coming from an abdominal sinus The findings will depend on the stage to which the ectopic pregnancy has developed Photographs of ectopic pregnancies at various stages are illustrated from personal records, indicating that they are all relatively common in surgical practice in the tropics Methods are suggested which will be found useful in establishing the diagnosis in all cases beyond doubt in a period not exceeding four hours Reduction in the death-rate in this condition depends on an early and accurate diagnosis and prompt efficient operative treatment with blood replacement

Undoubtedly ectopic pregnancy is caused by pathology within the Fallopian tube In most cases it is due to bacterial infection of some sort which causes interference with the ciliary action of the lining epithelium or chronic congestive changes in the tube wall of sufficient degree to preclude easy passage of the fertilised ovum from the outer end of the tube to the uterine cavity

Whereas it is usual to diagnose ectopic pregnancy in patients between the age of onset of menstruation and the time of the menopause only, cases have been encountered and operated upon where ruptured ectopic pregnancy occurred in a schoolgirl prior to the onset of menstruation and in more than one instance in women who had recently passed the menopause It seems that ovulation may occur [illegible]

is invariably made in these cases by an internal hæmorrhage of [illegible]
A tubal mass is not palpable in all cases of ectopic pregnancy, particularly if the pregnancy is at a very early stage

The use of X-ray examination of the abdomen for the detection of fœtal bones or a calcified fœtus is only of value in cases of advanced ectopic pregnancy or in cases where the fœtus had died long since, leaving a residual mass within

15

Ectopic Pregnancy

VARIETIES AND INCIDENCE OF ECTOPIC PREGNANCY

THE subject of ectopic pregnancy has become of such relatively minor importance as a cause of death in obstetrical practice in Europe that scant attention is given to the subject in recent works on gynæcology and obstetrics Under these circumstances it is not unnatural that the gravity of the situation, as it exists in tropical surgical practice, is not fully appreciated by most medical men going to the tropics, who have received their medical education in Europe Macafee [1] points out that death due to hæmorrhage in ectopic pregnancy resulted in a loss of 0 07 per 1,000 pregnancies in England and Wales in 1946 Many doctors have never seen a ruptured ectopic pregnancy during their student days and few if any during resident appointments in general hospitals This training therefore leaves them ill-equipped to recognise the condition quickly and deal with it promptly when they see it in the tropics soon after arrival there Anderson,[2] working in the United States of America, found that the average incidence of ectopic pregnancy relative to normal pregnancy was 1 in 167 pregnancies This figure is considerably higher than that noted in England He observes that the condition is more common in coloured women than in white women, being 1 in 126 pregnancies in the former, but only 1 in 185 in the latter The relative incidence of ectopic pregnancy in different communities can be judged only if the survey covers all communities

Figures from individual institutions are not fully representative of the position throughout any one country It can however be said with fair certainty that ectopic pregnancy is very much more common in urbanised populations in Africa and other parts of the tropics than it is in Europe As opposed to this the condition is still rare in African communities living long distances from large towns and ports Visiting Navrongo Hospital in upcountry Ghana in 1957, it was noted that no cases of ectopic pregnancy had been seen in two years, also in another country station, Wa, Northern Territories, Ghana, no case of the condition had been operated upon in three years, but in one of the main commercial centres in that country the average number of ectopic pregnancies dealt with is fifty two per year While acting as house surgeon in England only four cases were personally noted in four years in large general hospitals to which they were ordinarily admitted at that time, whereas working in the tropics eighty cases were personally operated upon in four years The condition was approximately twenty times more frequently seen in the tropics than in Europe This gives only a very rough approximation of the position There are many factors influencing the figures It is quite obvious, however, that the whole subject assumes much

she had missed one menstrual period and the diagnosis was in favour of the condition being an ectopic pregnancy. Although she was known to have sickle cells present, it was thought that the present attack was not due to the sickle cell condition. She had no headache or limb pains which are very usual in sickle cell disease. This case was operated upon and a ruptured ectopic pregnancy removed.

It is very embarrassing to open the abdomen and find no ectopic pregnancy present and later find that the abdominal attack is of sickle cell origin. In view of the increasing reports of thalassæmia, which is a condition very closely allied to sickle cell disease, a timely warning is necessary as in this condition, which is encountered not only in Africa but in Southern Europe and over a wide area in Asia, blood crises are seen very similar to those noted in true sickle cell disease.

With a view to decreasing the risk of recurrence of ectopic pregnancy in patients who have had one ectopic pregnancy operated upon, they should subsequently be treated for chronic salpingitis with penicillin or sulpha drugs, as in almost all cases there is chronic infective disease in the other tube.

ECTOPIC PREGNANCY BEFORE RUPTURE

Patients who have an unruptured ectopic pregnancy present are brought to hospital complaining most frequently of lower abdominal pain. The discomfort is of an intermittent character, being present for a few hours at a time and then disappearing completely for from half to one day before the onset of the next attack. The patients are usually found to have had the pains for about a week or ten days. The severity and frequency of the discomfort cause the patient increasing concern. There is usually a history of one menstrual period being missed. The possibility of the pains being due to appendicitis or salpingitis must be considered. An ectopic pregnancy within a Fallopian tube gives rise to tubal pain, but is not usually associated with a rise of temperature as occurs in the case of in [illegible] on

of th [illegible] us
and [illegible] ble
it can be taken that it is enlarged to some extent. An early tubal pregnancy is frequently not palpable as a localised mass. It is therefore necessary to look for other evidence of early pregnancy if ectopic pregnancy is suspected. The history of a missed period or a very short last menstrual period is very characteristic. This in combination with lower abdominal pain should give rise to suspicion of the condition.

In most cases of early pregnancy the uterus is slightly enlarged and the cervix softened, whether the pregnancy is within the uterus or in the extra uterine position. The enlargement is presumably of hormonal origin. Such enlargement may even occur in the absence of a pregnancy if artificial ovarian hormones are taken by mouth. A normal pregnancy within the cavity of the uterus does not give rise to lower abdominal pain if other structures within the pelvis are healthy. It can be reasonably assumed that if lower abdominal pain and other evidence of a pregnancy are present, the pregnancy is likely to be ectopic in position. The

the abdomen The history given by patients with a full term ectopic pregnancy which has died within the abdominal cavity is very characteristic The patient comes for examination with a marked distension of the abdomen, very like a full-term pregnancy The mass, however, feels much less cystic or rubbery than a normal pregnancy The hardness and lack of elasticity about it gives the impression that the condition probably is a uterine fibroid The woman invariably maintains that she is pregnant, but if asked about menstruation says that she is having regular periods The initial conclusion is that the condition must be due to a large fibroid If this history is given and a fibroid is suspected the patient should be questioned critically It is invariably found that menstrual periods have been missed for many months, possibly nine, at some time in the past, but that monthly periods started again and have since remained regular This no doubt is due to the death of the fœtus within the abdominal cavity and re-establishment of ovarian hormonal activity which ceases to be counteracted by the normal hormones of pregnancy The history is so characteristic that it warrants X-ray examination of the abdomen of any patient who gives it

In African patients it is quite important to consider the possibility of this condition as it is certainly not altogether rare Five cases were reported by Bowesman and Chenard [3] and these were noted within a period of six weeks Such a coincidence is, of course, unusual Charlwood and Culiner [1] reported fifty two cases occurring in Johannesburg, South Africa within twenty years—that is, approximately one every five months Hume [5] reported a further case in East Africa The condition is also known to be common in China

Abdominal sinus as a manifestation of late ectopic pregnancy has not been seen personally in Europe, but has been encountered on several occasions in the tropics The passage of fœtal bones per rectum after a late ectopic pregnancy ulcerated into the sigmoid colon is not unknown It may be added that abdominal sinuses due to late ectopic pregnancy have been found, in nearly all cases seen, to be placed below the level of the umbilicus In tropical surgical practice ectopic pregnancy should be considered in the case of any woman of child-bearing age who has an unexplained lower abdominal swelling of long duration which is not easy to account for

In African patients it is quite important to exclude the possibility of sickle cell crisis as the causative factor in any abdominal attack simulating a ruptured ectopic pregnancy This is particularly the case in young women in the early twenties age group who say that they have not missed any menstrual period In such attacks there is marked pallor of the conjunctiva, considerable abdominal distension and a marked degree of sweating and a fast pulse rate The condition is very suggestive of an internal hæmorrhage The three points which should suggest the possibility of a sickle cell crisis in these cases are headache, pains in the limbs and back, and a high temperature, none of these being usual in cases of ectopic pregnancy As, however, about 20 per cent of African female patients have sickle cells in the circulation, the finding of sickle cells may be noted in patients with ruptured ectopic pregnancy so that caution is necessary in judging the position In one case a young woman known to have sickle cell disease was admitted to hospital with symptoms suggestive of a ruptured ectopic pregnancy,

Large fimbrial cysts sometimes give rise to a spherical mass between the uterus and the ovary Being cystic in character they simulate an ectopic pregnancy very closely If a pregnancy test is undertaken in these cases it is negative To be able to confirm quickly that a pregnancy is not present and that a cyst of some sort is giving rise to the symptoms is very useful If ectopic pregnancy can be confidently excluded treatment can be arranged with less haste and at the patient's convenience.

In treatment of ectopic pregnancy, to state that the pregnancy should be removed with the tube involved but with no further qualifications is inadequate. It should be remembered that a woman who has an ectopic pregnancy in one tube usually has pathological changes in the other tube also Under these circumstances it is advisable, if the ectopic pregnancy is involving the isthmus of the tube or the inner half of the structure, to remove the inner half of the tube only with the ectopic pregnancy The outer wide half or two-thirds of the tube should be conserved and so be available for reimplantation back into the uterus at a later time. This gives the woman a further chance of a pregnancy even if her other tube is damaged Conservation of the outer half of the tube is seldom given consideration by doctors with limited experience Only if the other tube has previously been removed by an earlier ectopic pregnancy operation may this point be thought of Half a tube is better than no tube If there is a possibility of conserving the outer half of the tube it should certainly be done Reimplantation of the outer half of the tube should not be undertaken at the time of the initial ectopic pregnancy operation It is more likely to be successful if further operation is undertaken at a later date The optimum time is between six months and one year after the initial operation for the ectopic pregnancy

Treatment for chronic salpingitis should be given to all patients following operation for ectopic pregnancy Thread ligatures are suitable for tying off the remnants of the tube and broad ligaments after removal of the ectopic pregnancy They get a firm grip and do not cause undue local reaction They are safer to use than catgut which is more liable to slip If knots are well tied where thread is used, the ends can be cut at 2 mm length Curved artery forceps of the cholecystectomy type are suitable for use when removing a tubal pregnancy It is a simple matter to elevate the points, making ligation of stumps easier than when straight forceps are used The minimum of tissue is removed and the number of ligatures employed on removal of the ectopic pregnancy is minimal

At the time of operation careful inspection of the pelvic structures should be made to see if any other pathology is present which can be dealt with safely On several occasions two ectopic pregnancies have been found at the same time, one on each side The possibility of a patient having one pregnancy in the uterus and an ectopic pregnancy in a tube giving rise to the symptoms may be better assessed at operation than on examination of the pelvis before operation The operative risk in dealing with an unruptured ectopic pregnancy is remarkably low, being less than 1 per cent The risk is greatly increased if the ectopic pregnancy has ruptured and the woman is suffering from a severe internal hæmorrhage Hence the desirability of dealing with ectopic pregnancy cases as soon as the condition is suspected

possibility must be considered of a pregnancy developing within the uterus in a woman who is suffering from a chronically enlarged and infected tube on one side, which is of long-standing duration If a pregnancy is in the uterus the increased blood supply of the structure can be detected by marked pulsation of the uterine arteries The pulsation is equal on both sides If an unruptured ectopic pregnancy is present there is slightly increased pulsation on the side of the ectopic pregnancy, but if the pregnancy ruptures the pulsation in the uterine artery is less on the side of the ruptured ectopic pregnancy than on the other side It seems that there is a spasm of the artery on the side of the rupture and it cannot, therefore, be felt so easily as on the opposite side The spasm of the artery is a natural protective mechanism to decrease blood loss

In cases of suspected unruptured ectopic pregnancy, biological or chemical tests for pregnancy find their greatest use By the use of such tests pregnancy can be confirmed or refuted with considerable accuracy In view of the impending danger of rupture of an ectopic pregnancy, it is essential to obtain a quick result which will immediately indicate the presence or absence of a live pregnancy Whereas biological tests using mice, toads or rabbits are very efficient, a final result may not be possible under twenty-four hours using any of these tests It is, therefore, advised that for such cases where a result is urgently required a Voge's chemical test for ectopic pregnancy be carried out This can be undertaken immediately in the consulting room at the patient's first visit The test takes only a few minutes to perform The only reagent required is bromine water, and it is as easy as testing the urine for albumin It consists of adding bromine water to a diluted specimen of the patient's urine and bringing it to the boil A positive result is indicated by a colour change See Extracts, Chapter 14

If on clinical examination of the patient's pelvis and breasts there is evidence suggestive of an early pregnancy and pelvic discomfort is present in addition, the patient should be admitted to hospital for observation A pregnancy in the uterus and chronic unilateral salpingitis of long standing may give rise to the greatest difficulty in diagnosis Difficulty is also at times encountered where there is a congenital anomaly of the uterus with a pregnancy in a rudimentary horn Acosta-Sison[6] comments on this condition and mentions the fact that most uterine developmental abnormalities are brought to light initially when the patient becomes pregnant and on examination an ectopic gestation is suspected and a laparotomy undertaken

As the method of treatment of ectopic pregnancy is essentially surgical the patient should be admitted to hospital if the condition is suspected There is an increasing risk of hæmorrhage as the pregnancy proceeds The necessity for gentle examination is obvious for the pregnancy may be ruptured if undue local pressure is exerted on it A pregnancy situated in the ampulla of the tube can be dislodged very easily It is not uncommon to find a patient being admitted to hospital late in the evening with a ruptured ectopic pregnancy who had been examined earlier in the day and considered to have an unruptured ectopic pregnancy This usually occurs where a patient declines to come into hospital, wishing to consult the relatives before being admitted

75 degrees, bringing the patient almost to the standing position The pulse-rate is then again taken after one minute, noting the alteration in rate The patient must be supported on the stretcher to prevent slipping If the patient is suffering from depletion of blood volume the pulse-rate rises rapidly due to assuming the upright position If there is a rise in the pulse-rate of twenty-five beats per minute, it can be concluded that active internal hæmorrhage is taking place If there is a rise of pulse-rate between twenty-five and forty at least 1 litre of blood has been lost into the peritoneal cavity If in addition to a rise of pulse-rate of between twenty-five and forty beats per minute, there are signs of dizziness or fainting the volume of blood lost into the peritoneal cavity corresponds to 1½ litres If there is an obvious rise of pulse-rate within one minute above twenty-five, it is not necessary to continue readings at further minute intervals and the patient should be brought back to the horizontal position This rapid method of estimating the presence of hypovolæmic shock due to internal hæmorrhage is of great value Where patients are seen at an early stage there is insufficient blood in the peritoneal cavity to give rise to a fluid thrill Early operation is indicated in cases of internal hæmorrhage and the theatre should be made ready while the patient is being prepared The hæmorrhage must be stopped by removal of the ectopic pregnancy and the blood volume restored by blood transfusion The rate of blood loss from a ruptured ectopic pregnancy varies greatly, but it is on an average usually about the same as the rate at which blood is given intravenously in a blood transfusion In patients where 4 or 5 pints of blood have been lost the acute symptoms have usually existed for not less than twenty-four hours The absence of skilled help in many country stations often makes it tempting to give a patient with a ruptured ectopic pregnancy a spinal anæsthetic for operation This, however, is contraindicated and a most dangerous procedure as the blood-pressure is always very low and the risk of lowering it further by spinal anæsthesia is prohibitive Patients with this condition are best operated upon using ether anæsthesia accompanied by a free flow of oxygen Because of the patient's low condition, very little anæsthetic is required

On one occasion a patient was seen suffering from a ruptured ectopic pregnancy with a large quantity of blood in the abdominal cavity The doctor in charge of the case sought a further opinion because it was noted that the patient was unconscious and quite cold, also the pulse could not be felt at any part of the body In spite of this, respiration was still reasonably good It seemed as though the patient would certainly die within a short time In the absence of any perceptible pulse the patient's condition seemed to preclude the use of general anæsthesia, and it was therefore decided that an operation might be undertaken using local anæsthesia, or possibly none Local anæsthesia was prepared in readiness for its use, but it was decided to make the initial incision without any anæsthesia to see if the patient would be disturbed by it, as she was already deeply unconscious and could not be roused by pinching, pin pricks, or other forms of stimulation As there was no movement of limbs or body elicited by the initial incision the operation was continued without any anæsthesia Blood was removed from the peritoneal cavity, some citrate was added and an immediate transfusion instituted with the blood removed from the peritoneal cavity The ectopic pregnancy was

ECTOPIC PREGNANCY WITH MASSIVE INTERNAL HÆMORRHAGE

Most cases of ectopic pregnancy seen in Europe are detected before rupture has occurred In tropical surgical practice, where patients tend to seek advice at a relatively late stage, the vast number of cases of ectopic pregnancy are seen when a massive internal hæmorrhage has already occurred This condition is the most common cause of internal hæmorrhage in female patients in the tropics The diagnosis is immediately suggested if there is evidence of internal hæmorrhage in the absence of history of violent trauma Patients who are ill with typhoid fever may have severe secondary hæmorrhage into the intestinal tract, but such cases seldom simulate ruptured ectopic pregnancy cases

Diagnosis of ruptured ectopic pregnancy is usually not difficult at the stage where massive internal hæmorrhage into the peritoneal cavity has occurred Only if there is very little blood within the peritoneal cavity are errors likely to be made Salpingitis may sometimes cause confusion at an early stage The history of one missed menstrual period is very characteristic of ectopic pregnancy By the time hæmorrhage has occurred into the peritoneal cavity there is frequently a palpable abnormality present in the broad ligament position If there is a fluid thrill within the abdomen the diagnosis seldom presents difficulty It is, however, not easy to detect a " succussion wave " unless there is approximately 1 litre of blood in the abdomen of an adult This means that much time is lost in operating on the case if it is necessary to have a fluid thrill present to be able to confirm the diagnosis Such a thrill is most easily detected if the left hand is pressed on the patient's right iliac fossa position and the abdominal wall is struck to the left and slightly above the umbilicus with the fingers of the right hand The patient should be lying in bed in the horizontal position and tilted somewhat over to the right side Where an acute internal hæmorrhage has occurred the patient almost invariably gives a history of a fainting attack and falling on the floor or being compelled to lie down quickly as a result of dizziness In cases where sudden severe hæmorrhage occurs into the peritoneal cavity the patient is usually found to have missed one, if not two, menstrual periods Very frequently at the time of admission to hospital, it is noted that there is a small hæmorrhagic loss per vaginam, this is suggestive of death of the fœtus It is essential for successful treatment to make a diagnosis as early as possible A missed period, lower abdominal pain, a fainting or dizzy attack associated with sweating, some abdominal distension and an abnormal pelvic mass in one of the broad ligament positions are characteristic signs

The best method of detecting early blood loss into the peritoneal cavity, before a fluid thrill can be elicited, is to undertake the " tilt test " described by Green and Metheny for hypovolæmic shock By this method the diagnosis of internal hæmorrhage can be made with precision in a matter of minutes instead of wasting time waiting for a rise of pulse-rate while the patient is lying horizontal in bed The test has been described in detail in Extract 7, Chapter 7 The test briefly consists in taking the patient's pulse-rate when seen lying in the horizontal position on a stretcher, the stretcher is then raised at the head end to an angle of

usually improves considerably and an ordinary fast drip transfusion with a drip indicator inserted is then instituted Where large quantities of blood have been lost into the abdomen 1 litre of blood is usually returned to the patient during and following the operation The remainder of the blood is kept and can be used for other patients if required during the next few days If glucose citrate is used to preserve the blood it keeps much better than if citrate solution alone is used An effort should be made to obtain blood from relatives who may be willing to donate it If the blood is not used for their own relative because of autotransfusion being employed, the blood can be used for other patients who may be in need of it

In most areas of the tropics there is much greater difficulty in getting blood for transfusion than in Europe It is advisable always to use a drip indicator when giving a transfusion If this is not done, blood may enter the circulation unduly quickly and there is a considerable risk of pulmonary œdema developing In one case where this unfortunately happened there was no drip indicator available These pieces of glass apparatus are broken very easily, so it is advisable if possible to purchase plastic drip indicators which do not break and therefore give prolonged service They can be sterilised by boiling like plastic syringes If no drip indicator is available one can easily be made using the barrel of a 2 c c syringe with a cork in it through which a No 14 gauge exploring needle is inserted

In only a limited number of cases is the fœtus found on opening the abdomen particularly in early cases where the fœtus is small, about 1 cm in length In later cases the fœtus is larger and is usually obvious It is advisable to remove the Fallopian tube involved or at least the part of the tube where the pregnancy is placed so that the hæmorrhage is arrested The ovary should not be removed indiscriminately and it can usually be separated easily from adherent blood clot

In some instances of ectopic pregnancy more than one fœtus can be found This has been noted on several occasions More than one fœtus may come from the same tube or on rare occasions there may be an ectopic pregnancy in each tube, one ruptured the other unruptured On one occasion a "quin" ectopic pregnancy was encountered Three fœtuses were found when the tube was being removed and the staff nurse in attendance detected two more fœtuses as blood was poured from the spoon scoop into the receiver On several occasions patients who have had a ruptured ectopic pregnancy removed have brought an accompanying pregnancy within the uterus to full term It is not always easy to confirm that there is a second pregnancy within the uterus, as the uterus is in any case somewhat enlarged For some years progestin was given following operation in cases where a second pregnancy was thought likely to be present in the uterus, but in none of these cases did a pregnancy mature The practice of giving progestin was therefore given up If there is a pregnancy in the uterus the operation of removing an ectopic pregnancy is unlikely to upset the pregnancy within the uterus *If the* pregnancy within the uterus continues, as it usually does, the patient will continue to have amenorrhœa and it will be obvious within a month or two *that there is a* developing pregnancy still present

very easy to remove, requiring only three or four ligatures to tie it off It took a very short time to complete Six pints of blood were removed from the patient's abdomen Only when the patient's abdomen had been completely closed did the patient move one leg The pulse at the end of the operation was small but reasonably good To our surprise the patient made an uneventful recovery, she had no knowledge of the operation at all and was conscious only of the operation wound on awakening

It is advisable to operate on ruptured ectopic pregnancy cases with reasonable speed Much time is saved if sterile suction apparatus is available with which to remove the blood from the peritoneal cavity For removal of free blood from the peritoneal cavity, where suction apparatus is not available, as is so often the case in country stations, much the most efficient method is by the use of a sterilised ordinary soup ladle A large stainless steel spoon of this type can be sterilised and kept for this purpose It does not rust, and with this simple piece of domestic apparatus large quantities of liquid blood can be removed quickly in a matter of a few minutes and made available for autotransfusion The area of the abdomen from which blood can be taken most easily and quickly is the right hypochondrium area beneath the liver position The patient is placed in a slight Trendelenburg position which also facilitates the operation by keeping the small bowel away from the pelvis The use of a large spoon of this sort causes minimal trauma to internal structures, as the smooth back of the spoon presses against the viscera This method is a great improvement on the use of large abdominal packs for the removal of free blood It is not essential to remove all the blood from the abdominal cavity though as much should be taken out as can be removed with ease and speed Autotransfusion has been adopted as a routine procedure in almost all cases during the past twenty years and no reactions have been noted as a result of this practice If, however, blood has been in the abdominal cavity for several days and there is evidence of some hæmolysis having taken place, the blood is not used for transfusion

To avoid loss of blood over the table from the abdominal cavity on opening the peritoneum, it is advised that after incision of the skin and separation of the fibromuscular layers of the abdominal wall the peritoneal cavity should be opened over a length of 1½ in only initially, into this opening the index finger of the left hand is placed and the flow of blood controlled by slight traction and rotation of the second phalanx from the vertical position to the horizontal, so occluding the opening intermittently as required When the middle phalanx is in the upright position, the blood flows out and can be caught in the stainless steel spoon The flow of blood is stopped by rotating the second phalanx to the horizontal position over the peritoneal vent An intermittent flow of blood is thus maintained as required, and the maximum amount can be collected in this way without undue loss It has been found an advantage in many patients with severe blood loss to obtain blood in this way and give a rapid autotransfusion of half a pint initially by the syringe method, alternating two 20 c c syringes, one being filled with blood [illegible]

is obvious In these cases not infrequently only a small quantity of dark brown blood can be withdrawn The character of the blood can be seen most easily if it is squirted out of the syringe on to a white gauze swab The needle in these cases frequently enters the blood clot and so becomes blocked after very little blood enters the syringe The blood is seldom of a very bright red colour as seen in cases of acute tubal rupture, with massive intraperitoneal hæmorrhage Tapping the peritoneal cavity for diagnostic purposes does not appear to be a dangerous procedure and the small bowel is very seldom if ever damaged It is very difficult to puncture small intestine with a serum needle intentionally unless it is held firmly in position If there is much fluid in the abdomen, gas in the small gut



FIG 147

Tubal abortion showing unruptured amniotic sac, containing fœtus

carries the intestines to a high floating position away from the site of puncture Tapping the peritoneal cavity for blood is an efficient method of diagnosing late cases of tubal abortion If blood remains for several days in the abdominal cavity the patient's temperature rises to about 100 4° F even in the absence of septic infection which is rare In patients in the tropics in whom there is almost invariably a low-grade chronic malarial infection present, the hæmopoietic disturbance of an internal hæmorrhage is sufficient to precipitate a rise of malaria parasites in the peripheral blood This could account for a slightly higher temperature range in patients in the tropics following internal hæmorrhage than is likely to occur in patients who have not lived in malarial zones

Most chronic low-grade inflammatory conditions are treated better without operation, relying on the use of appropriate antibiotic drugs, rest and sedatives Cases of ruptured ectopic pregnancy should all be operated upon Having seen a large number of these cases, it is quite obvious that they become quite ill if large quantities of blood remain in the abdominal cavity, being allowed to absorb

LEAKING TUBAL ABORTION

In this variety of ectopic pregnancy there may be much difficulty in diagnosis Because of the frequent absence of very urgent symptoms patients often come to hospital having been ill for one, two or even three weeks at home Although a menstrual period has been missed and lower abdominal pain has occurred, the patient may unintentionally give a very fallacious history She says she has not missed any menstrual period in the belief that the slight vaginal loss which did occur at the time of the onset of pain was a menstrual period which was a little delayed The acute pain, having passed off, has little stress laid on its severity

On examination the patient usually looks pale and ill There is lower abdominal pain and tenderness, but no well-localised area of acute discomfort There is some abdominal distension with a generalised boggy feeling about the lower abdomen There is usually a slight fluid thrill on percussion of the abdominal wall, felt by the examining hand as it maintains pressure on the contralateral position Pelvic examination gives the impression that there is a generalised inflammatory condition of the pelvic structures present The rather matted feeling makes it difficult to differentiate clearly between the individual structures The possibility that the whole condition is of an inflammatory nature suggests itself If a pregnancy test is undertaken more than one week after death of the gestation in an ectopic case, it is usually found to be negative and this finding is very misleading With a negative pregnancy test the obvious conclusion is that no pregnancy has ever been present and that the condition is probably inflammatory in nature It is essential to remember that a pregnancy test becomes negative

remain positive In such cases and in chorion epithelioma the gonadotrophin increases after loss of the fœtus and the pregnancy test becomes increasingly positive

The absence of urgent symptoms in cases of tubal abortion is due to the fact that the pregnancy is developed in the trumpet-like end of the Fallopian tube With increase of size the pregnancy becomes displaced very easily as seen in Fig 147, where the whole unruptured amniotic sac is seen with the placenta attached sliding out of the tube, the fœtus can be seen quite easily within the amniotic sac The tube remains unruptured and hæmorrhage occurs from the placental bed rather than from a ruptured tube wall The hæmorrhage is of the slow leaking type rather than a sharp arterial hæmorrhage from a tear of the tube wall In late tubal abortion cases with a negative pregnancy test and no evidence of acute hypovolæmic shock the diagnosis is made most easily, if the condition is suspected, by tapping the peritoneal cavity to see if free blood is present in the abdominal cavity Blood can be withdrawn either by tapping through the posterior fornix of the vagina, as a colpotomy, or with the patient lying in Fowler's position in bed, the needle being entered in the right iliac fossa The abdomen can also be tapped with the patient in the knee elbow position, inserting the needle close to the umbilicus in an area where the skin is thin The necessity for aseptic precautions

abdominal packs for arrest of this slow bleeding and not to close the abdomen with undue haste In some cases the use of "gelfoam" or other forms of fibrin preparations is useful In a small number of cases tubal abortion may go on to advanced pregnancy, becoming attached to a new site after dislodgement from the fimbria of the Fallopian tube Some of the pregnancies going to full term are those from the centre of the tube where rupture has occurred at an early stage in the downward direction, between the layers of the broad ligament The blood is in this way confined to a localised area and the pregnancy develops to an advanced stage The subject of late extra-uterine pregnancy is of sufficient importance and frequency in the tropics to warrant a special discussion on the subject

ECTOPIC PREGNANCY SINUS FORMATION

Ectopic pregnancy should be terminated by a timed surgical procedure where the condition has been diagnosed as a result of typical signs and symptoms at an early stage If no operative treatment is undertaken the patient dies from internal hæmorrhage in a high proportion of cases In a small number of instances, possibly 10 per cent, the patient survives the initial catastrophe and slow improvement then occurs In about half of the patients who recover from the initial attack the pregnancy remains alive, that is 5 per cent of ectopic pregnancies The patient has withstood the internal hæmorrhage because it was due to a low-grade leakage from a tubal abortion with displacement of the pregnancy to a new site, or in cases where the pregnancy ruptured into the layers of the broad ligament and was so confined to a localised tissue space

Poddar,[8] working in Calcutta, analysed a large series of ectopic cases and found that 4 09 per cent had gone to full-term pregnancy This is not an unusual finding in tropical surgical work The figure corresponds closely to personal experience Undoubtedly between 5 and 10 per cent of ectopic pregnancies recover from the initial internal hæmorrhage and the pregnancy proceeds to a more advanced stage In about half of these cases the pregnancy proceeds to the sixth or eighth month as in the case reported by Ashworth,[9] the pregnancy then dying within the peritoneal cavity In the remaining half of the cases a further 5 per cent of the pregnancies proceed to full term in the extra uterine position It is difficult to estimate the age of an advanced ectopic pregnancy where the pregnancy has died many months or even a year earlier Where the fœtus dies and is retained within the abdomen it becomes shrivelled up, in some instances, within the fibrotic sac (Fig 148) In some instances this sac can be dissected out completely On opening the sac quite a mature though shrunken fœtus is seen (Fig 149) The age of such a fœtus is often difficult to ascertain

MacGregor[10] reported a case of full-term extra-uterine twin pregnancy with a macerated fœtus in one loculus and the other healthy twin in a separate space which was removed alive Laycock[11] noted two cases of full-term interligamentary type of ectopic pregnancy, in one case the baby was alive and in the other dead The mother survived operation in both cases The five cases reported by Bowesman and Chenard[3] were all noted within less than three months In Johannesburg,

slowly Patients suffer from a degree of breathlessness and œdema suggestive of myocarditis, which is of much more marked degree than the extent noted in cases which have been operated upon at an early stage where much blood has been lost It seems that the breathlessness and œdema are not so much due to the loss of blood as to the toxic action of the degenerating blood as it is absorbed from the abdomen into the circulation in a somewhat altered state Some of these late cases recover slowly if not operated upon, but it is thought wise not to rely on conservative measures in these late cases, but to open the abdomen and remove as much free blood and blood clot as possible

If on colpotomy puncture clear fluid is withdrawn in cases of suspected ectopic pregnancy, the fluid should be tested to see if it contains any organisms If the fluid is clear the case is not one of ectopic pregnancy Such findings occur where the fluid in the abdomen is due to inflammatory conditions such as tuberculous peritonitis or where there is an obstructive lesion of the hepatic circulation with congestive changes and ascites

On more than one occasion cases have been operated upon for tubal abortion who have had a previous ruptured pregnancy removed which involved the opposite Fallopian tube The question here arises whether in these adverse circumstances it is permissible to swab away the remains of the placental tissue from the ampulla of the tube alone, without taking away any of the tube tissue, or if the tube should essentially be removed There may be some risk in attempting to swab away the remains of the placenta If all placental tissue is not removed hæmorrhage may continue, and furthermore there is a theoretical danger of the development of a hydatidiform mole or malignant changes Considering the subsequent history of these patients and the psychic trauma caused by sterilisation of a woman in the tropics, who has almost invariably a strong desire to have children, it is concluded that where only one tube remains conservative methods are justifiable The risk of a further pregnancy in a pathological tube, however, must be appreciated Appropriate treatment should be ordered to decrease the risk of further ectopic pregnancy developing Most women in the tropics are quite prepared to take this risk of a possible further ectopic pregnancy rather than be deprived of any further hope of a pregnancy

Conservative removal of a pregnancy from the middle third of a ruptured tube is most unlikely to leave a patent tube after the operation, because of the small calibre of the lumen at that position It is better in these cases to remove the damaged area of the tube, leaving if possible the outer third of the tube The outer third of the structure is very much wider than the inner portions and if it can be reimplanted into the uterus, at a later time, there is a fair chance that the woman may have a further pregnancy with the pregnancy entering the uterus It is advisable in these cases of tubal abortion where the patient's condition is poor to give a donor blood transfusion before operation is undertaken This improves the patient very considerably and decreases the post-operative risks

Where blood and blood clot has been in the abdominal cavity for up to two weeks the surface of all the pelvic structures becomes markedly congested There is a marked tendency for these surfaces, from which clot has been removed, to ooze blood Sutures may not hold easily when inserted It is wise to apply hot

of late extra-uterine pregnancy Whereas in a normal pregnancy the uterus, being a midline structure, is essentially in front of the anterior limits of the vertebral bodies in an extra-uterine pregnancy the fœtal bony shadows are in a high proportion of cases seen to be posterior to the anterior edge of the vertebral bodies, on viewing the lateral X-ray photographs, indicating that they are not within the uterine cavity If an extra-uterine pregnancy is suspected at the advanced stage a hysterogram using lipiodol is permissible as a final means of elucidating the nature of the condition

Where an advanced ectopic pregnancy *dies within the peritoneal cavity* it may become calcified into a lithopædion or in other instances it becomes infected If infection occurs a massive low-grade abscess is formed and the pregnancy then ulcerates into the intestinal tract or to the surface of the abdomen This latter mode of termination of pregnancy is seldom seen in Europe The condition of ectopic pregnancy sinus formation is not uncommon in the tropics, as a fair proportion of patients in country villages with ectopic pregnancy do not go to hospital There is therefore a much higher number of these patients who, if they do survive an initial internal hæmorrhage, remain with the pregnancy within the abdomen The pregnancy develops to an advanced stage and then the fœtus dies with ultimate shrinkage of the mass The mass ultimately becomes infected in some cases and involves other structures In most cases the pregnancy becomes adherent to the posterior aspect of the anterior abdominal wall if originated from a tubal abortion If the advanced pregnancy is of the interligamentary type it is covered by peritoneum and does not adhere to the abdominal wall The two types are easy to recognise at operation and differ ... pregnancy
invar ...



FIG 150
Extra uterine lithopædion removed from abdominal cavity

to all local structures If it becomes infected it forms a sinus which bursts out through some part of the anterior abdominal wall Fig 151 shows a patient with such a sinus appearing somewhat above and to the right of the umbilicus It is more common on the right side than the left The possibility of an advanced ectopic pregnancy must always be borne in mind in adult female patients *in the* tropics who have a tumour mass of long duration present in the abdomen In these cases there is a marked absence of symptoms referable to the intestinal tract The patient is usually seen initially with an inflammatory mass about the lower abdominal wall The swelling develops very slowly, taking several weeks before fluctuation is apparent Pelvic examination suggests that the primary trouble is within the pelvis as there is evidence of chronic inflammatory changes with

Charlwood and Culiner[4] collected records of fifty-two cases in twenty years The condition is undoubtedly comparatively common amongst African patients Where a fœtus dies late in term it degenerates and the changes are associated with formation of unsaturated fatty acid products and there is a marked tendency to calcium deposition with lithopædion formation Fig 150 shows a good example of this condition This specimen was removed in 1955 The patient was found to have this lithopædion present and also a large uterine fibroid and an ovarian cyst This patient recovered quickly following removal of the uterus, one ovary and the complete ectopic pregnancy The woman was aged 50 years and so had passed the menopause If a careful history is taken in these cases it is usual to find that the patient suffered from a severe abdominal attack several years earlier



Fig 148



Fig 149

Fig 148—Late abdominal pregnancy removed complete in sac.
Fig 149—Same case as Fig 148 showing degenerating fœtus removed

Nurses and doctors invariably ask, on seeing a lithopædion removed, how many years it is likely to have taken to develop Such a remarkable stone-like specimen, simulating a marble statuette, takes from five to ten years to be produced it is thought Leech[12] submitted a valuable report in reference to this point He noted in taking a careful history from a patient, for whom a lithopædion was removed, that the earlier intra-abdominal catastrophe had occurred ten years previously The abdominal attack was associated with six months' amenorrhœa This attack undoubtedly corresponded to the early stage of the pregnancy which ultimately resulted in the lithopædion formation A lithopædion is not always extra-uterine in position One excellent specimen was removed in 1936 where the pregnancy was within the uterus

In diagnosing late extra-uterine pregnancies it should be remembered that pregnancy tests decrease in positivity from the twentieth week of gestation A late negative pregnancy test does not necessarily exclude a live pregnancy after that time, whether it be within or outside the uterine cavity Fortunately reliance can be placed on X-ray examination after the fifth month of gestation Feeney[13] has pointed out the extreme value of a lateral X-ray photograph in suspected cases

multiple adhesion in the lower abdomen X-ray examination is advisable if apparatus is available *Fœtal bones are almost invariably* apparent in the X ray pictures Where the patient already has a discharging sinus, it will be found that if a probe is entered into the *sinus, fœtal bones can be detected,* giving rise to the sensation of a bone sequestrum, as in cases of osteomyelitis Fig 152 shows a typical sinus due to ectopic pregnancy opening below the umbilicus In these cases fœtal bones can usually be removed as shown in Fig 153, where the bones have been laid on the patient's chest They were so placed that they could be identified while being removed Almost all the bones of the fœtus can be seen here and identified There is some risk in these cases of producing a fæcal fistula on removal of fœtal bones, though with care the risk is not very high

Great caution must be exercised in enlarging an ectopic pregnancy sinus in order to avoid damage to the intestinal tract Injury of the bowel is much less



Fig 153
Fœtal bones removed from subumbilical ectopic pregnancy sinus

likely to occur if the sinus is opened from above downwards only, and not in the upward direction The pregnancy, having come from the lower abdomen, is likely to push the intestine upwards as it enlarges in size It is not necessary in these cases to make any effort to remove the placenta, for the pregnancy having died many months or years before, the placenta becomes a fibrotic mass adherent to the wall of the adventitious cavity If an extra uterine pregnancy is dissected out completely before it is ruptured, drainage is not advisable as there is no infection present in most cases Some serum may accumulate in the area but this will be absorbed Patients should be given antibiotic drugs following the operation, to decrease the risk of sepsis which is the greatest hazard If the cavity is already infected and broken down into a sinus it should not be closed after the fœtal bones have been cleared out Large doses of antibiotic drugs should be given in order to ensure rapid control of the sepsis and encourage the sinus to close Closure takes about four weeks if all fœtal bones are taken out X-ray of this case following operation did not show any residual bone shadows The patient recovered quite quickly.

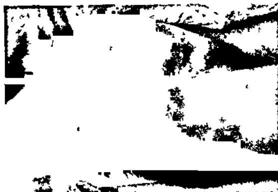


FIG 151
Ectopic pregnancy sinus, right side



FIG 152
Subumbilical ectopic pregnancy sinus

pregnancy, is usually not quite symmetrical and is rather hard in type, lacking the
rubbery consistence of a normal pregnancy. As the patient is usually having
regular periods a fibroid is almost invariably suspected. Personal experience
ultimately teaches those working in the tropics that where a woman in these areas
maintains that she is pregnant great care must be exercised before refuting her
statement dogmatically.

If a full-term pregnancy is alive a fœtal heart should be heard without difficulty.
Fœtal movements may or may not be felt. Even though an advanced pregnancy
is not alive the patient often persists that fœtal movements are being felt. With
a high gas-producing diet containing maize, the patient may misinterpret intestinal
movements for fœtal movements. Berkeley and Bonney [15] are very guarded in
their comments on the surgical approach to the problem of how to deal with
full-term ectopic pregnancy cases. They state that "the whole question of the
operative treatment is beset with great difficulties, the more so as these cases are
so rare that no individual operator has sufficient experience to enable him to
generalise, while the conditions are so different in the anatomy that no two cases
are alike"; those working in the tropics undoubtedly get much more experience
in dealing with these cases than surgeons working in Europe. If the fœtus is dead,
operation should be undertaken as soon as the condition is diagnosed with certainty.
The risk of fœtal loss is very high if a live fœtus is removed at a premature stage.
Prematurity predisposes to neonatal loss whether the pregnancy is or is not in th
uterine cavity.

Schumann [16] in his monograph on extra-uterine pregnancy refers to the surv
of the literature on this condition by Beck and considers also the many replies
a questionnaire sent to two hundred obstetricians on the subject. He conclud
that the best time to operate on these cases where a live pregnancy was pres
was between the sixth and seventh months, although the added risk in waiting f
well-developed child was considered to be slight up to the thirty eighth week,
the danger of a catastrophe in the last two weeks of pregnancy was sufficien
warrant operative interference before this period is reached. It is considered ur
to defer operation indefinitely in the hope that the fœtus may die and so mak
operation easier by a natural decrease in the local blood supply. Individual
require special consideration. If a woman has an advanced ectopic pregnanc
the fœtus alive, she should certainly be in hospital all the time for the remain
her pregnancy. If she has several children alive it is personally considered
operate on the condition as soon as the diagnosis is made, as the risk to the m
and her other children already alive, is too serious to take any chances. If, h
the woman is an elderly primipara or a multipara who has lost her previous c
more consideration must be given to the possibility of the woman gettin
infant. With the greatly increased risk of hæmorrhage after the thirt
week, it is considered that operative removal should be undertaken
thirty-seventh week, thus giving the optimum chance of a live child of r
maturity.

A high transverse position of the fœtus late in pregnancy is very
of an extra-uterine pregnancy, as pointed out by Acosta-Sison [17]. It migh
that if the fœtus is in an unduly high position as well as being transvers

FULL-TERM EXTRA-UTERINE PREGNANCY

Full-term extra-uterine pregnancy is much more commonly seen in tropical surgery than in surgery in Europe Ramoso-Jalbuena,[11] working in the Philippine Islands, points out that the occurrence of full-term extra uterine pregnancy is of sufficient frequency in the tropics to warrant suspecting the condition if the patient is one or two months over the expected time of delivery It is essential in such cases to make detailed enquiry as to whether the woman had a severe abdominal crisis at about the second month of pregnancy suggestive of a tubal abortion It is not unusual to find in these cases that a patient arrives at the expected time of delivery and has severe abdominal pain for one or two days which then passes off Three to four weeks later a normal menstrual period occurs On examination the position of the fœtus is usually rather abnormally high in position Fœtal parts can be felt easily The uterine cervix in late cases of extra-uterine pregnancy is usually pointing in an abnormal direction, most commonly in a lateral direction, which is most unusual and unlikely to be due to other conditions, the fundus of the uterus being pressed over to one lateral wall of the pelvis by the pregnancy above it

In some cases a woman may develop an intra-abdominal pregnancy with fertilisation taking place on the surface of the ovary, but in most cases of late extra-uterine pregnancy the condition follows tubal abortion At the time when these patients present for examination at hospital, it is not unusual to find that they are having normal menstrual periods They maintain that they are pregnant and give a history that they have had amenorrhœa for nine months Many patients, however, soon forget the severity of the early abdominal attack associated with a possible tubal abortion, and deny that they have ever had any discomfort They later admit it to the nurses

Where a full-term extra-uterine pregnancy develops following tubal abortion the uterus and both Fallopian tubes are below the pregnancy and the pregnancy is closely adherent to the surrounding structures, bowel, bladder and great vessels If a late extra uterine pregnancy develops as a result of a rupture of the middle third of the Fallopian tube, between the layers of the broad ligament, and the pregnancy continues, the pregnancy will be found at term to have an enormously elongated strap-like Fallopian stretching right across it for a distance of up to 12 in An interligamentary pregnancy is extraperitoneal in position and therefore is covered by peritoneum and so does not necessarily become adherent to other structures It is not difficult, therefore, to enter the peritoneal cavity in dealing with an interligamentary type of extra uterine pregnancy, in other cases following tubal abortion or primarily abdominal in type the condition is intraperitoneal in position and densely adherent to all local structures, making them much more dangerous Of five cases dealt with by Bowesman and Chenard[3] which were reported, two of the cases were of the interligamentary type and so extraperitoneal in position, while three were intraperitoneal in type and probably followed tubal abortion, the Fallopian tube being in the latter type beneath the pregnancy Cases of this type are usually sent to hospital, being referred for the removal of large "fibroids" The abdominal swelling, though maintained by the woman to be a

opened in this case, as it was pulled up into a very abnormal position The patient had been catheterised before the operation started The bladder was repaired without any subsequent misadventure The umbilical cord was cut off close to its attachment to the wall of the cavity which contained the infant The site of attachment did not look like placenta, but rather like the fibrotic wall of the cavity only The main mass of the placenta had degenerated and there was not a large local blood supply in this particular case

Schumann,[16] *recording the experimental work of Beck*, noted that this worker in attempting to ascertain the fate of a sterile placenta put into the peritoneal cavity of a female dog at laparotomy, *found on reopening the animal's abdomen* two months later that the placenta was completely gone, being absorbed This valuable experiment is of paramount importance in reference to dealing with advanced extra-uterine pregnancies The placenta can more safely be left in the position than removed in many cases Removal of the placenta should not be undertaken unless it shows a natural tendency to separate itself at operation The placenta in these cases is attached to the intestinal mesentery which is a *non-contractile bed If the placenta is removed the absence of contraction from* the placental site gives rise to a serious predisposition to hæmorrhage which may be wellnigh uncontrollable It is therefore advised in these cases that the placenta be left *in situ* unless it shows a natural tendency to separate, in which case leaving it might be dangerous

The abdominal wound should be closed without drainage, for by so doing the risk of infection is decreased The serum which accumulates locally is easily absorbed *In cases dealt with by Chenard*[3] *a tendency was noted for the placental* site to bleed and separate and so he dissected out the placenta complete, arresting the attendant hæmorrhage It may be difficult at the time of operation to ascertain accurately the site of the uterus The general tendency will be found for the placenta to separate in live pregnancies, while if the pregnancy is dead the blood supply is smaller and the placenta does not tend to separate In one case almost uncontrollable hæmorrhage from the placental bed at the back of the uterus necessitated the performance *of a subtotal hysterectomy* The fœtus was removed alive in this case

REFERENCES

1 MACAFEE, C H G (1957) Hæmorrhage associated with pregnancy and childbirth p 307 In *Modern Trends in Obstetrics and Gynæcology*, ed Bowes London Butterworth
2 ANDERSON, G W (1951) The racial incidence of ectopic pregnancy *Amer J Obstet Gynec* 61, 312
3 BOWESMAN, C & CHENARD A H (1948) Full term extrauterine pregnancy *Irish J med Sci* p 132
4 CHARLWOOD, G P & CULINER, A (1955) Advanced extrauterine pregnancy *J Obstet Gynaec Brit Emp* 62, 555
5 HUME, V R (1956) A case of extrauterine pregnancy *E Afr med J* 33 277
6 ACOSTA SISON H (1952) Developmental anomalies of the uterus *J Philipp med Ass* 28 495
7 GREEN, D M & METHENY, D (1947) Estimation of acute blood loss by the tilt test *Surg Gynæc Obstet* 84 1045

abnormal position is constantly maintained for several weeks, the likelihood of an extra-uterine pregnancy is very high

If the pregnancy is of the intraperitoneal type and not of the interligamentary variety, it will be found on attempting to open the abdomen that the peritoneal cavity cannot be entered easily as through a discrete membrane, but that there is a marked thickening with obvious induration beneath it On carefully incising the deeper tissues, it becomes quite obvious that there is something adherent to



FIG 154

Full term extra uterine pregnancy fœtus removed from the abdomen having been retained for two and a half years in the abdomen (Photograph by kind permission of the Editor, *Irish Journal of Medical Science*)

the back of the abdominal wall At this stage further clearance of local tissue ends in opening into a cavity, and immediately fœtal parts, a hand or a foot, are seen The nature of the condition is then obvious Fig 154 shows a remarkable specimen of a fœtus removed from a woman's abdomen which had been present for two and a half years It was found on taking an accurate history after the operation that the patient had had amenorrhœa for nine months, three years earlier On opening the cavity containing the fœtus no amniotic fluid was lost The infant was in a remarkably good state of preservation It was obvious that there was no infective process going on The infant appeared to be quite mature The irregular discoloration of the skin was caused by desquamation in an African baby which is normally lightly pigmented The pigmented areas were somewhat darker where the epidermis had not come away The woman's urinary bladder was inadvertently

16

Difficult and Obstructed Labour

PATIENTS IN DIFFICULT AND OBSTRUCTED LABOUR

WITHOUT doubt the subject of difficult and obstructed labour gives rise to great concern to doctors having to undertake obstetrical work in the tropics This type of service is a matter of urgency and must be attended to promptly and in a decisive manner Other work has to be laid aside to deal with the emergency, even though some patients are inconvenienced

Textbooks devoted exclusively to the practice of obstetrics deal adequately with normal labour It is proposed here to deal only with the subject of difficult and obstructed labour as the problem arises in country hospitals in the tropics A suitable classification of labour into Normal, Difficult and Obstructed can be conveniently based on the duration of labour, whether delivery occurs in the first, second or third twenty-four hours Few labours exceed seventy two hours, the duration period being considered as from the time of onset of labour to the time of birth of the child—the third stage is not included Whereas difficult and obstructed labour occurs more commonly in short women of below 5 ft 2 in than in those of the tall class, over 5 ft 6 in, many small women seen in the tropics of less than 5 ft in height have been found to have a comparatively easy labour A heavily built short woman very frequently has difficulty in childbirth The type of small woman who delivers with fair ease is usually of the petite type, but well proportioned, having a small face, small hands, a narrow chest and rather slender in appearance They tend to produce small infants commensurate with their physique The type of short woman who has difficulty in labour has usually got a broad face, heavy limbs and is rather short in the length of the femur Short women require very careful observation in labour, but shortness in itself should not necessarily indicate that Cæsarean section is almost inevitable The adaptation of the baby's head to the mother's pelvis is obviously of paramount importance If there is no brim obstruction to the baby's head and it enters the pelvis adequately, vaginal delivery will almost certainly be possible Delivery may be slow relative to delivery in taller women In the tropics, in patients of small stature, obstetrical obstruction is frequently of the outlet type This is much more common than inlet obstruction If obstetrical help is not given, these women have a prolonged labour In many cases there is fœtal loss, and if the labour enters the third twenty-four hours, there is a high risk of vesicovaginal fistula formation following parturition Rupture of the uterus is most frequently seen in women over the age of 30 years who have been in labour over a period of thirty hours Uterine rupture is rare in patients under the age of 30 years

8 PODDAR D L (1957) A

9 ASHWORTH F L (1958)

10 MACGREGOR I G (1934)

11 LAYCOCK H T (1955)

12 LEECH R B (1951) A case of lithopædion *E Afr med J* 28 90

13 FEENEY J K. (1956) Broad ligament pregnancy and case notes *I ish J med Sci* p 92

14 RAMOSO-JALBUENA J (1956) Term extrauter ne pregnancy *J Ph l pp med Ass* 32 335

15 BERKELEY C & BONNEY V (1947) *Textbook of Gy ræcolog cal Surgery* 5th ed p 660 London Cassell

16 SCHUMANN E A (1931) *Extra terine Pregnancy* London & New York D Appleton & Co

17 ACOSTA SISON H (1956) A survey of cases of abdominal and intraligamentary pregnancies in the Phil pp nes *J Ph l pp med A s* 32 379

At the stage of difficult labour, when many patients in the tropics are first seen, it is not easy to measure the diagonal conjugate length The head is usually low and firmly fixed in the pelvis at this stage, having already passed through the internal conjugate diameter The patient in these cases is invariably suffering from a degree of "outlet obstruction" and will, in most cases, if unassisted, deliver spontaneously but very slowly with high fœtal loss, or have to be assisted by obstetrical forceps If the head arrives in a low position in the pelvis, and there is no advance in labour and the bladder is not full, the case should be either assisted by forceps or in some cases by symphysiotomy If on palpating the abdomen of the patient it seems that the fœtus is in the occipito posterior position, and the head is well down in the pelvis, it is seldom possible to push the head up and rotate it into the occipito-anterior position When patients are first seen in the second twenty-four hours of labour, the fœtal membranes have almost invariably ruptured already In many instances repeated vaginal examinations have been undertaken by the midwife, qualified or unqualified The case in these circumstances must be classed as infected If the fœtus is still alive, it is a matter of urgency to effect delivery for the child's sake as well as the mother's well being X-ray examination at this stage is seldom of value and only in a limited number of cases is it possible to have it done Figs 140 and 141 show X-ray photographs of a patient with a subpubic angle below normal and a short internal conjugate length due to marked anterior prominence of the sacrum Sen,[2] on his observation of a large number of confinements in Indian patients, has estimated the likelihood of delivery relative to the subpubic angle With the subpubic angle of 85 2 degrees, normal delivery may be expected if the internal conjugate length is adequate With a subpubic angle of 84 degrees low forceps may be anticipated or in some instances symphysiotomy may be used With angles in the 60 and 70 degree ranges, decapitation was undertaken if the child was dead and Cæsarean section if the child was alive A certain proportion of patients who show no advance in labour when the head is already low in the pelvis are found to have a full bladder

Patients in the tropics tend to drink very large quantities of water, and in their urgent distress frequently ask for water to drink Overfilling of the bladder, therefore, occurs at a time when it is difficult to empty it In these cases the bladder must be emptied whether it be with a rubber catheter or metal catheter, per urethram if possible In some cases it is necessary to resort to a suprapubic tapping and aspiration of urine through a lumbar puncture needle This is permissible where a metal catheter cannot be passed, due to the blocking effect of the fœtal head at the back of the pubis It is seldom desirable to give the patient an enema late in labour, but an enema is obviously an advantage at the onset of labour if the patient is constipated

Fœtal monstrosities and multiple pregnancies must be considered as a possible cause of obstructed labour, though neither is a common cause of it Where a woman has already had one normal delivery, it can be assumed with average chances and good fortune that her further deliveries will be normal It certainly indicates that her pelvic measurements were adequate at one time for normal delivery It must be remembered, however, that there are so many variable factors that each delivery necessitates a reassessment during the antenatal period

With a small round pelvis, so commonly seen with a relative decrease in the transverse diameter, the instance of persistent occipito-posterior presentation is much higher than in tall women who have a more oval type of pelvis. With short women there is a relative loss of the transverse diameter length with relatively very little decrease in the anteroposterior or conjugate diameters. External pelvic measurements, interspinous, intercrestal and external conjugate in short women are of little value and there is therefore a tendency in tropical obstetrics to disregard their external pelvic measurements in favour of estimating the woman's birth capacity on assessment of the subpubic angle taken in combination with the diagonal conjugate length of the pelvis. The optimum subpubic angle is 86 degrees. If the subpubic angle exceeds 90 degrees, caution must be exercised that one is not dealing with a flat or platypelloid type of pelvis. Flat pelvis is associated with an abnormally wide angle of over 90 degrees in most cases. If the subpubic angle, on the other hand, is below 82 degrees, that is 4 degrees below the optimum, this suggests that there is a generally contracted pelvis with a very small outlet measurement. The average subpubic angle in most women of medium size in the tropics is 85 degrees. In combination with the measurement of the subpubic angle it is essential to measure the "diagonal conjugate" length of the pelvis. This distance is the measurement between the promontory of the sacrum and the lowermost part of the symphysis pubis or pubic bridge. A good diagonal conjugate length is 4¾ in. (12 cm.). The measurement is taken from the tip of the middle finger pressing on the promontory of the sacrum to the position near the base of the index finger which corresponds to the position of the base of the symphysis pubis. The position is marked off by the index finger-nail of the other hand. It is pressed on to the examining hand at the position of the base of the pelvic bridge, so giving two fixed points, the distance between which can be measured easily. If from the diagonal conjugate distance ¼ in. is deducted, the true conjugate distance is deduced, giving 4½ in., that is 11.4 cm., or 11 cm. to the nearest whole number, which is easier to remember. It is very useful to remember the figures 11, 12 and 13 cm. as being the approximate normal brim measurements of a fairly good gynæcoid pelvis. The figures represent the three diameters—anteroposterior or true conjugate, the diagonal brim inlet and the transverse diameter of the brim. In small women with a rather more round type of pelvis the measurements are frequently 11, 11½ and 12 cm., there being a rather more round-shaped pelvic brim with a slight loss of transverse width. A 4 in. (10.2 cm.) "diagonal conjugate" diameter is the minimum length consistent with normal delivery and this is only if the fœtal head is classed as "very small". Delivery in these cases with minimal measurements may have to be with the help of obstetrical forceps. Sen,[1] giving the average biparietal head measurements of Indian babies, classes them according to the biparietal length as: very small, 3 in. (7.6 cm.), average, 3.5 in. (8.9 cm.), and large, as 4 in. (10.2 cm.). The biparietal diameter must be slightly less than the true conjugate length. To deliver heads of these sizes the diagonal conjugate measurement needs to exceed the head length by ½ in. (1.3 cm.). A 4 in. fœtal head takes a minimal diagonal conjugate length of 4½ in. (11.5 cm.) in order to permit of normal delivery. A small amount, approximately ¼ in. (0.65 cm.), should be allowed for the interposition of soft tissues.

hours, her physical condition is deteriorating There is an increase of pulse rate and a falling blood-pressure and a slight rise in the temperature The patient is suffering from pain, loss of sleep and mental distress There is invariably early infection at this stage It is advisable in all these cases to give a dose of penicillin initially Surgical intervention can thus be undertaken more safely and morbidity is decreased Pethidine (50 mg) is a suitable sedative to give as it does not depress the infant nor interfere with the patient's respiration if a general anæsthetic becomes necessary In the second twenty-four hours of labour no further trial of labour is permissible and active steps must be taken to deliver the woman as soon as possible Ultimately relief of obstructed labour consists in breech extraction, forceps delivery, symphysiotomy or Cæsarean section, depending on the circumstances of the case *Caution must be exercised to avoid overlooking* cases of ruptured uterus Blood should be taken from relatives in ALL CASES of *obstructed labour, whether the type is suitable or not* The relatives are usually willing to donate blood when the situation is urgent If the blood is not of the

undertaken Blood should, therefore, be taken from the relatives when the patient is admitted and being prepared for operation

TRIAL LABOUR, ITS VALUE AND LIMITATIONS

A trial labour is a limited attempt at delivery with a view to assessing a woman's *capability of progress in childbirth per via naturalis, where the* estimated pelvic measurements are somewhat below normal An approximate judgment of the likelihood of success is based on the progress *achieved considering the time factor* If a patient when first seen has already been in labour twenty four hours or more there is seldom any question of further trial labour Having entered the second twenty-four hours of labour, normal delivery without complications to herself or the infant is unlikely In almost all cases of labour over twenty-four hours, active steps should be taken to ensure early delivery of the mother with a view to decreasing complications Trial labour should be considered only in mild cases of disproportion, this estimate being made before the onset of labour or soon after it has started At this stage the membranes are usually unruptured In cases where there is evidence of gross obstetrical obstruction or disproportion trial labour need not be considered Where X ray facilities are available and radiography *is undertaken a few days before delivery is anticipated, a fair* assessment can be arrived at as to the likelihood of a normal delivery Too much reliance, however, *should not be placed on radiography alone* A lateral X ray photograph should be taken as well as an anteroposterior view The size of the fœtal head in its biparietal diameter *relative to the internal conjugate length* is the most important consideration The relationship between the anteroposterior skull length and the transverse le ... cture is less important ... most important estimates being those of the diagonal conjugate ... ubic

Osteomalacia during pregnancy is a very serious condition MacGregor[3] comments on the importance of appreciating this condition which can occur in a woman who has had several previous normal deliveries When seen she is found to have gross bony deformity with completely obstructed labour due to the triradiate abnormality associated with this condition Osteomalacia is not very common in tropical countries but has been seen on five or six occasions personally

Cæsarean section is invariably necessary in these cases for delivery Shah[4] notes that whereas osteomalacia may occur at any age, it is seen most commonly in the second decade of the child-bearing period It gives rise to obstructed labour in a high proportion of cases in women who have had previous normal deliveries The condition is associated with

1 Deficiency of sunshine, chronic ill health and the Purdah system
2 Fœtal calcium needs which are greatest during late pregnancy
3 Absence of milk diet, which is common in many tropical areas
4 Inadequate vitamin D in the diet

In rare instances various pelvis tumours may obstruct labour Cervical fibroids occasionally act in this way A slowly increasing pelvic dermoid mass may also account for the obstruction Devi[5] reports a case of hydatic cyst situated in the pelvis causing obstructed labour

Breech deliveries are slightly more common in multiparæ than primiparæ They need not necessarily give rise to undue concern in multiparæ during the late antenatal period It should, however, be remembered that if the infant is in the breech position and the legs are extended, that is with the legs straight and the feet up in front of the face, delivery may be very slow and difficult In these cases there is an associated high fœtal loss If the patient is an elderly primipara and found to have a "breech with extended legs," it is advisable to undertake a Cæsarean section, because of the high risk to the child if vaginal delivery is attempted and the fact that the woman has not got a live child in spite of her age

In women with a normal pelvis, obstruction to labour occurs due to prolapse of an arm or a leg If an arm is prolapsed it must be replaced If the child's position is otherwise good and the head fits into the pelvis with adequate flexion, normal delivery is usually possible Where the position of the infant is poor, tending to the transverse lie, a vertex delivery is unlikely, and it is better in these cases to replace the arm and then undertake an internal version and a breech extraction The cervix is usually well dilated at the time an arm is likely to prolapse

In rare instances, as reported by Knight,[6] one encounters an obstetrical obstruction due to a congenital abnormality of the soft tissues In his case there was a bipartate vagina and double uterus There was an imperforate hymen to the left vagina, although the pregnancy was in the left uterus No doubt there was a communication in the vaginal septum separating the two sides Such circumstances are exceptionally rare but can be most confusing to those not having previously seen such cases Fig 121 shows a case of bipartate or "double vagina"

By the time a woman enters the stage of difficult labour, the second twenty-four

is fully dilated, Shlepkov [7] recommends the intravenous injection of 20 c c of 1 per cent novocain to the mother This technique has been attended by good results as it hastens delivery without detriment to the mother or child, it might therefore be usefully employed in a limited number of cases Novocain in ampoules is more likely to be available in remote stations where local and spinal anæsthesia are frequently employed for general surgery than uterine stimulants such as pitocin which is sometimes employed in small doses where there is perineal arrest

A trial labour should not exceed three hours where progress is not obvious If pelvic assessment suggests some degree of disproportion, it may be necessary to abandon trial labour before the normal average duration of labour is completed If there is some progress with the advance of time, the labour can be allowed to proceed up to a maximum of twenty-four hours If there is no obvious advance after three hours of trial labour, it is unlikely that ultimate success will be achieved In some cases there is no apparent advance after three hours, but then quite a marked advance after about four or five hours A final decision should be made after not more than six hours if advance is not apparent

In patients who have had a mild eclamptic fit before the onset of labour, trial labour should not be of prolonged duration Where the head enters the pelvis adequately, it is advisable after the os is fully dilated to deliver the child with forceps so that the second stage of labour is reduced to a minimum If a patient has had severe and repeated eclamptic fits before the onset of labour, Cæsarean section is justifiable and desirable

In tropical obstetrical practice caution must be exercised to guard against attacks of malaria at the time of labour Such attacks with headache, vomiting and albuminuria simulate eclampsia closely and, as the treatment is quite different, the condition must be appreciated and dealt with appropriately It is considered advisable to give patients in the tropics a short course of camoquin one week before delivery is anticipated in order to prevent malarial complications, as in patients about to undergo general surgery The single dose method of using camoquin is very satisfactory if antimalarial treatment has been overlooked during the latter weeks of pregnancy

Dysentery of any sort during labour is very serious If an obstruction occurs it is not at all safe to undertake a Cæsarean section in these cases, and it is considered that if obstetrical obstruction does occur it is best relieved by symphysiotomy, which allows of a comparatively easy labour The peritoneal cavity is not opened by this procedure

The ultimate methods of dealing with cases of partially or completely obstructed labour amount to one of four alternatives The propulsive force of the uterus can be increased by certain drugs up to the limit of safety This limit may not always be easy to estimate, and such treatment is not encouraged

If exerting force from above by this accentuated physiological effort is not thought safe an alternative method is the application of obstetrical forceps to assist the muscular action of the uterus by the use of traction Forceps traction in the absence of uterine contraction is detrimental to the mother and child careful timing of traction is therefore essential If the head enters the pelvic brim with

angle For these measurements radiology is not essential and they are therefore very important in clinical obstetrical practice in country stations If the subpubic angle is below 80 degrees the chances of a normal unassisted delivery are poor A trial labour may be attempted in these cases in the hope that the head will descend to a sufficiently low level to justify the use of forceps to deliver the child The true conjugate diameter should be an absolute minimum of 3½ in , that is to say, that the diagonal conjugate as measured manually should be not less than a minimum of 4 in.

The age of a patient is important in assessing a woman's chance of delivery where a mild degree of disproportion is present The normal child-bearing age is from 15 to 45 years—a total of thirty years The age of 30 years represents the half-way mark in the period of child bearing Ultimate obstruction and complications to the mother and the child are much less likely in the first half of the child bearing age, up to the age of 30 years than in the age period 30 to 45 Slightly higher risk in trial labour is therefore justifiable in the younger woman as opposed to those beyond the age of 30 years Great caution must be exercised with elderly primiparæ The risk of rupture of the uterus is much greater over the age of 30 than under it A previous Cæsarean section increases the risk of rupture of the uterus in cases of mild disproportion, and enquiry must be made as to the reason for lower abdominal operation scars The history of previous labour is also important With prolonged labour over twenty-four hours there is a rising rate of fœtal loss The average duration of labour in primiparæ can be taken to be eighteen hours, it is still considered to be within normal limits up to a maximum of twenty-four hours, but not beyond this time In multiparæ the average duration of labour is ten hours, it seldom exceeds eighteen hours unless there is insurmountable obstruction Where no apparent disproportion exists, undue concern should not be caused in labours not exceeding average durations according to whether the patient is a primipara or a multipara The history of duration of labour may not be very reliable its duration should therefore not be underestimated The risk to the mother and the child remains low while the membranes remain unruptured Progress in labour is sometimes retarded by strong membranes which remain unruptured after full dilatation of the cervical os If the os is fully dilated, fœtal membranes have ceased to exercise their useful function in equalising the distribution of pressure in the lower uterine segment while it is dilating It is therefore better to rupture the membranes at this stage After the fœtal membranes have ruptured, careful observation must be made at regular intervals in order to see that there are no signs of maternal or fœtal distress Physical distress in the mother is suggested by a rising pulse, attacks of vomiting and early abdominal distension Distress of the fœtus is suggested by a rising or markedly falling pulse-rate The normal fœtal pulse-rate is about 140 during labour The passage of meconium with amniotic fluid also suggests fœtal distress With long labour there is an increased risk of morbidity, and in view of this it is recommended that where trial labour is employed in cases of mild disproportion and a possible difficult labour anticipated with instrumental delivery, one large dose of penicillin should be given in the early stages of labour

In mild cases of disproportion, where the fœtal position is good and the os

be made on the right side of the cervix this decreases the risk of a rapidly exten tear of the cervix up into the lower uterine segment on the left side Such m more easily take place if a strong uterine contraction occurs just at the time w the first incision is made, if performed on the left side This operation is sel seen in temperate climates and is not mentioned in modern textbooks on obstetr The procedure is still, however, occasionally useful in certain well selected ca in the tropics and has been undertaken with satisfaction personally on four or fi occasions, the results being satisfactory in all instances and no complication being noted Delivery has followed in such cases soon after the incisions wer made The term "vaginal Cæsarean section" is sometimes used to describe this technique The length of each incision need not exceed ½ in (1 3 cm) With these limited incisions which involve the cervix only, not encroaching unduly on the lateral fornices, no serious damage is likely to be sustained by important near by structures There is a marked dilatation of the cervix permitted when the inelastic rim is severed The tissues of the lower uterine segment dilate quickly following the cervical relaxation and delivery soon takes place

As already noted, fibrous strictures of the vagina are very common in some parts of the tropics These are in most cases due to insertion of irritant tampons made from local herbs, the alleged object being to increase fertility There is no evidence to suggest that they achieve this object Such strictures are a potent cause of serious obstetrical soft tissue obstruction In many instances the stricture formation is so extreme that a lead pencil would not go through the opening which remains No procedure other than Cæsarean section can be undertaken in these cases with safety to deliver the mother

Scarring about the lower third of the vagina is seen in cases of "introcision," which is one of the modifications of female circumcision First and second degree female circumcision, where the clitoris and lesser labia are excised to varying extents, is seldom associated with obstetrical obstruction If the circumcision is extensive and followed by gross sepsis, it produces much scar tissue about the upper third of the vulva Extensive scar tissue in this position predisposes to a severe tear about 1 cm away from the midline in the prepubic position This site corresponds to the position of the external pudendal vessels and associated with the tear there is usually very extensive hæmorrhage It is frequently necessary in these cases of hæmorrhage to insert a suture through all soft tissue layers lateral to the bleeding area The suture can be removed after twenty-four hours, as it ncludes the skin Where "infibulation" is undertaken, "defibulation" is necessary efore childbirth No cases of this type have been seen personally, as they occur most exclusively in the north east quadrant of Africa In rare instances congenital alformations of the vagina are seen in pregnant women which cause obstetrical struction The case described by Knight [6] illustrates such a condition, there ng an imperforate hymen of the left vagina, although the pregnancy was in the -sided uterus The vaginal septum between the two sides is usually incomplete ts upper third, thus permitting the inception of a pregnancy on the side with imperforate hymen Fig 121 shows a personal case of a young woman with rtite or "double vagina" Knight's case was relieved by wide division of the rforate hymen, this was followed by spontaneous delivery

fair ease and there is outlet obstruction, symphysiotomy is an eminently satisfactory method of dealing with the case, trauma to the mother and child being minimal

Cæsarean section finally has to be resorted to in a limited number of cases This is a "by-pass method" where an insuperable pelvic obstruction exists Cæsarean section amounts to an admission of failure in dealing with the obstetrical obstruction in such a manner as will ensure a vaginal delivery The risk of Cæsarean section to the mother is very much greater than symphysiotomy Instrumental obstetrical procedures will be dealt with individually in separate sections as their importance merits special consideration

SOFT TISSUE OBSTRUCTION AND EPISIOTOMY

In a certain proportion of pregnant women who show no obvious evidence of contracted pelvis or disproportion and with the fœtus in good position, there is a delay or complete arrest of labour due to inadequate stretching of the soft tissues Failure of dilatation of the uterine cervix prolongs the first stage of labour The second stage of labour may be retarded by various forms of scarring or fibrosis of the vagina or about the vulva In some instances there is failure of adequate stretching of the perineum In temperate climates soft tissue obstruction is rarely seen other than about the perineum, it is seldom of a very severe nature The perineal obstruction is dealt with as required by episiotomy As opposed to these findings in temperate climates, it is found in tropical practice that associated with various forms of infection and ulceration of the soft tissues there is occasionally marked scarring of the local structures The cervix, the vagina or the introitus may be affected Chronic infection of endocervical glands gives rise to extensive Nabothian folliculosis, this condition is associated with marked cervical induration and fibrosis With the onset of labour the cervix does not stretch adequately in some of these cases In spite of strong and prolonged labour, the cervical opening does not exceed 2 in. in diameter The first stage of labour is thus held up It is necessary for the opening of the cervix to have a diameter equal to that of an infant's head, 3 to 4 in (8 9 to 10 2 cm), before the head will pass through it In the normal cervix the rim is elastic in character before it is completely "taken up" Where fibrosis of the cervix has occurred, dilatation is arrested usually when the os is only about 50 per cent dilated, that is at a width of 2 in (5 1 cm) A fibrotic cervical rim has a cartilage like feeling on examination without any evidence of elasticity In such cases the amniotic membranes frequently rupture early before full dilatation of the cervix occurs In these circumstances more direct and less uniform pressure is exerted on the fœtal head with uterine contractions *If the fœtal head has gone through the pelvic brim it may be necessary* in these cases to incise the cervix with a blunt-pointed pair of scissors at four positions The most suitable sites are as on a clock at 2, 4, 8 and 10 o'clock Using these positions, damage is avoided to the bladder and rectum, anteriorly and posteriorly, respectively, and to the uterine vessels and ureters laterally

From observations it seems that a uterine rupture in labour most frequently starts as a prolongation of a left sided old cervical tear It is advised in these circumstances that the two initial incisions, made to open a fibrotic cervix, should

anæsthesia a small dose is given and barbotage is not used, in this way "saddle
anæsthesia" is induced The injection is made with the patient in the sitting
position and a fine lumbar puncture needle is used (No 22 gauge) The small
gauge needle decreases the risk of post-spinal headache Perineal pain is dulled
for about three hours This method removes the partial inhibition of abdominal
muscle action caused by the perineal pain due to final stretching Delivery is
thus expedited and discomfort is relieved If an episiotomy is employed or
a tear of the perineum occurs, sutures can be applied without discomfort or
the use of further general anæsthesia Local injections are less satisfactory for
perineal anæsthesia

INSTRUMENTAL FŒTAL EXTRACTION

With normal childbirth at full term there is a ... nargin of clearance
between the bony structure of ... ly of the infant to
be born ... e of disproportion
... as the name implies ... Nature's expulsive muscular forces ... child, it is not possible
although originally performed post mortem, suggests the antiquity of an operation, which
operative effort made to preserve the life of the child at the decease of the mother, was an
A D 1738 records show that the first live Cæsarean section, with recovery of the
mother and the child, was successfully performed in Ireland by an unqualified
midwife, Mary Donally, after hope of delivery had been abandoned because of
impassable obstruction in the mother The mother and the child recovered
With improvement in anæsthesia and a knowledge of bacteriology and other aids,
surgical technique has improved progressively Attempts at instrumental delivery
had, however, been made in the sixteenth century, when, about 1590, Dr Peter
Chamberlen made the first pair of obstetrical forceps as an aid to difficult
childbirth The instruments were kept secret by the inventor and members of
his family, some of whom became doctors, for successive generations These
instruments were ultimately hidden away in a secret recess in the floor of his
family home near London where they lay apparently lost and forgotten for nearly
two hundred years Long after the Chamberlen family home had been sold the
instruments were rediscovered by a new occupant in A D 1818 The original
forceps were finally retrieved by members of the medical profession and are now
a treasured obstetrical exhibit of historic value, encased in the library of the
Royal Society of Medicine, London These original instruments have been
personally examined with great interest There are five instruments in all Each
one has a slightly different joint mechanism From the design of the original
instruments all the various forms of modern obstetrical forceps have ultimately
been derived

The difficulty of application of an instrument with permanently jointed blades,
held by a screw joint, was obvious at an early stage Some of the later Chamberlen
forceps had the two separate blades tied together with strong cord, the cord no
doubt being employed after the blades had been applied

be made on the right side of the cervix this decreases t tear of the cervix up into the lower uterine segment o more easily take place if a strong uterine contraction the first incision is made, if performed on the left si seen in temperate climates and is not mentioned in m The procedure is still, however, occasionally useful in the tropics and has been undertaken with satisfa occasions, the results being satisfactory in all i being noted Delivery has followed in such case made The term "vaginal Cæsarean section" this technique The length of each incision need these limited incisions which involve the cervix the lateral fornices, no serious damage is likely to b structures There is a marked dilatation of the c rim is severed The tissues of the lower uterine the cervical relaxation and delivery soon takes pl

As already noted, fibrous strictures of the parts of the tropics These are in most cases d made from local herbs, the alleged object bein evidence to suggest that they achieve this object of serious obstetrical soft tissue obstruction formation is so extreme that a lead pencil would remains No procedure other than Cæsarean cases with safety to deliver the mother

Scarring about the lower third of the vagin which is one of the modifications of female circu female circumcision, where the clitoris and l extents, is seldom associated with obstetrical ob extensive and followed by gross sepsis, it produ upper third of the vulva Extensive scar tissue severe tear about 1 cm away from the midline site corresponds to the position of the external with the tear there is usually very extensive hæmorr in these cases of hæmorrhage to insert a suture thr to the bleeding area The suture can be removed includes the skin Where "infibulation" is undertak before childbirth No cases of this type have been almost exclusively in the north-east quadrant of Afric malformations of the vagina are seen in pregnant w obstruction The case described by Knight[6] illust being an imperforate hymen of the left vagina, althou left-sided uterus The vaginal septum between the tv in its upper third, thus permitting the inception of a the imperforate hymen Fig 121 shows a personal c bipartite or "double vagina" Knight's case was reli imperforate hymen, this was followed by spontaneous

It seems quite unjustifiable to use obstetrical forceps of a large size on a very small woman In spite of this there is in almost all country stations in the tropics only one pair of obstetrical forceps, which is often of the largest size made In areas of the tropics where patients are, on the average, of relatively small stature, it is advisable to have obstetrical forceps of a small size available, the most suitable patterns being those designed by Das or Fergusson Both these instruments are of relatively small size

The percentage of women delivered by the aid of forceps varies very greatly, depending on the conditions which are considered suitable by the doctor concerned for forceps delivery If the statistics of various maternity hospitals are examined it will usually be found that, if the percentage of deliveries by forceps is added to the percentage where Cæsarean section is employed, the two figures will almost invariably be equal where work is carried out under comparable conditions At two large maternity hospitals in Dublin, Eire,[11, 12] this is very noticeable

Coombe Hospital, Dublin, 1955

		Per cent
Forceps deliveries		8 5
Cæsarean section		3 7
	Total	12 2

National Maternity Hospital, 1955

		Per cent
Forceps deliveries		10 5
Cæsarean section		1 6
	Total	12 1

The combined percentage for both hospitals was thus 12 2 and 12 1 per cent respectively These figures may be influenced to a considerable extent, depending on whether the procedure of symphysiotomy is undertaken or not in obstructed labour In both these Dublin hospitals symphysiotomy is undertaken with about equal frequency

In hospitals in the tropics with special departments for obstetrical work the rate of obstructed labour is usually greatly in excess of that seen in Europe In many areas only those cases unable to deliver at home are brought to hospital In Nigeria, however, Nolan[13] had a particularly low rate for Cæsarean section—4 1 per cent compared with many other tropical hospitals the forceps delivery rate was 5 1 per cent—total, 9 2 per cent At this hospital in Eastern Nigeria there is a high symphysiotomy rate of 9 per cent which undoubtedly accounts for the relative decrease in relief of obstruction in labour by other instrumental methods It is not unusual to find an all over obstructed labour rate in tropical hospitals of up to 20 per cent of the labour cases admitted As the local people become more familiar with and confident in the medical services available the rate of obstructed labour decreases

It seems quite unjustifiable to use obstetrical forceps of a large size on a very small woman In spite of this there is in almost all country stations in the tropics only one pair of obstetrical forceps, which is often of the largest size made. In areas of the tropics where patients are, on the average, of relatively small stature, it is advisable to have obstetrical forceps of a small size available, the most suitable

Fergusson Both these instruments are

by the aid of forceps varies very greatly depending on the conditions which are considered suitable by the doctor concerned for forceps delivery If the statistics of various maternity hospitals are examined it will usually be found that, if the percentage of deliveries by forceps is added to the percentage where Cæsarean section is employed, the two figures will almost invariably be equal where work is carried out under comparable conditions At two large maternity hospitals in Dublin, Eire,[11] [12] this is very noticeable

Coombe Hospital, Dublin, 1955

	Per cent
Forceps deliveries	8 5
Cæsarean section	3 7
Total	12 2

National Maternity Hospital, 1955

	Per cent
Forceps deliveries	10 5
Cæsarean section	1 6
Total	12 1

The combined percentage for both hospitals was thus 12 2 and 12 1 per cent respectively These figures may be influenced to a considerable extent, depending on whether the procedure of symphysiotomy is undertaken or not in obstructed labour In both these Dublin hospitals symphysiotomy is undertaken with about equal frequency

In hospitals in the tropics with special departments for obstetrical work the rate of obstructed labour is usually greatly in excess of that seen in Europe In many areas only those cases unable to deliver at home are brought to hospital. In Nigeria, however, Nolan [13] had a particularly low rate for Cæsarean section—4 1 per cent compared with many other tropical hospitals the forceps delivery rate was 5 1 per cent—total, 9 2 per cent At this hospital in Eastern Nigeria there is a high symphysiotomy rate of 9 per cent which undoubtedly accounts for the relative decrease in relief of obstruction in labour by other instrumental methods It is not unusual to find an all over obstructed labour rate in tropical hospitals of up to 20 per cent of the labour cases admitted As the local people become more familiar with and confident in the medical services available the rate of obstructed labour decreases

It is necessary to make a careful *preliminary assessment of the case before* forceps are applied The blades of obstetrical forceps are so made that they can be easily engaged or disengaged, facilitating application *Before forceps are* applied it is necessary to give a general or spinal anæsthetic Particular caution must be exercised if a *spinal anæsthetic is decided upon, that the mother's condition* is sufficiently good to warrant its use, the blood-pressure being adequate With a very low spinal anæsthetic of small *volume, 0 5 c c of heavy nupercain being* used, the anæsthesia is of the limited "saddle type" and the blood-pressure should not be decreased *A very small dose of ephedrine, 0 25 gr, is suitable* as a safeguard against this potential risk The spinal injection is given with the patient in the sitting-up *position No barbotage is used in order to keep the* effect low and very localised to the perineum The individual blades of the forceps should be applied, *one on each side of the head, when the head is in the occipito*-anterior position If the fœtus has assumed the occipito-posterior position, *preliminary rotation of the head is essential, into the occipito-anterior position* To pull the child through the perineum with the head in the occipito posterior attitude is *associated with gross trauma to the mother and also to the fœtus with a high fœtal mortality rate*, it should therefore not be undertaken In rare cases *where the child is already dead and it is not found possible to rotate the head,* cerebral perforation and extraction of the child in the occipito-posterior may be *found to be the only safe alternative The loss of cerebral contents with perforation* facilitates the extraction by markedly decreasing the cranial diameters An obstetrical forceps with an axis traction indicator attached to the handle is now seldom used, the essential object of the axis traction indicator being to show the *direction of the pull required at various levels in the pelvis as the head descended* from the high position to the pelvic floor *As high forceps is now considered contraindicated*, axis traction apparatus ceases to have the same importance as formerly Obstetrical forceps are not suitable for breech presentations *To pull a pair of engaged forceps through the vulva while gripping the head* of the fœtus invariably causes severe perineal tearing This practice is *frequently seen, and unnecessary trauma is caused by a lack of appreciation of the* correct technique

The forceps *should* be unlocked and the individual blades removed as soon as the head is sufficiently low to *dilate the vulva to a diameter slightly short of that* required for the passage of the head. *If this is done, the next pain occurring after the removal* of the blades usually brings the baby's head through the perineum and a tear is thus avoided Traction with forceps should be applied only while there is a labour pain in progress *It is useless and unnecessary to continue traction* when the uterine contraction has passed off *To relax the forceps between the* pains decreases the risk to the child and is restful to the operator If the blades of the forceps are applied along the palm of the hand in the midline position and then rotated in appropriate fashion, it should not be necessary to use force to secure the proper blade position *One case was seen where the back of the vagina was* detached from the posterior aspect of the cervix as a result of force being used against resistance to attain the final blade position As a result of this accident the woman had to have a Cæsarean hysterectomy performed to save her life

Forceps delivery is indicated in cases of midpelvic obstruction and outlet obstruction only High forceps delivery should be abandoned altogether in view of the very high risk to the mother and the child If the fœtal head does not pass through the brim of the pelvis there is no place for forceps extraction Such cases, which are comparatively rare, should be relieved by Cæsarean section Application of forceps is indicated in low pelvic obstruction where there is onset of distress in the mother, the labour exceeding twenty-four hours in a primipara and eighteen hours in a multipara Many cases of midpelvic obstruction are associated with slight disproportion and rotation of the fœtal head into the occipito posterior position Delivery usually takes place spontaneously but after a prolonged labour in these cases It is better, if possible, to push up the head and rectify the position to the occipito anterior position, this can sometimes be accomplished manually, but not infrequently the head is so tightly jammed in the pelvis that at the time the patient is first seen it is not possible to alter the position manually In order to recognise the occipito-posterior position, the sagittal suture should be felt for This will be found usually in the diagonal line of the pelvis, in some cases it is directly anteroposterior, depending on the level of the pelvis to which the head has reached when the case is seen In order to know which position of the head is posterior it is essential to feel for the anterior fontanel With occipito posterior positions the anterior fontanel is at the front of the pelvis The anterior fontanel of the fœtal skull is much more apparent than the posterior fontanel, which is often not palpable The anterior fontanel is usually easily recognised This is the best method of ascertaining with certainty that the occipito-posterior presentation is present Abdominal palpation as a method of detection of occipito-posterior position is unreliable If direct manual rotation is not possible, and this has been found personally seldom to be so with any degree of safety, the use of Kielland's forceps may facilitate rotation This is a particular type of forceps with the blades approximately in the same line as the handles The small pelvic curve present is compensated for by a slight degree of angulation close to the joint position A forceps with a marked pelvic curve without angular compensation is not suitable for rotating the fœtal head in the pelvis A Kielland's forceps must be used with great care as it, too, may be a very damaging instrument if injudiciously employed The contrary indications to the use of forceps are inlet pelvic obstruction and malpresentation of the fœtus as well as breech presentations Forceps are made for cases of minor pelvic disproportion with midpelvic and outlet obstruction essentially They should be used in vertex presentations only Failure to extract the fœtus by forceps is detrimental to the subsequent success of Cæsarean section This usually happens where a high forceps delivery is unwisely attempted The prerequisite preliminary conditions necessary for the applications of forceps are

1 That no gross obstetrical obstruction exists, minor disproportion only being present
2 That the uterine cervix is fully dilated
3 That the bladder and rectum are empty
4 That the fœtus is in a good vertex position

a method of extracting the fœtus, his efforts were never brought to fruition Almost a hundred years later further attempts were made with the principle of suction for extraction of the child

Two suction instruments, that of Malmstrom[15] from Sweden and another as used in Yugoslavia and the U S S R, are now well established as efficient pieces of apparatus for this purpose Fig 155 shows diagrams of the instrument in use as employed by Finderle,[14] Petchenko,[16] and Chachava[17] The vacuum extractor of Malmstrom is shown in Fig 156 The extractor is usually applied to the vertex of the fœtal skull, but as Aristova[18] notes, an added advantage over forceps is that it can be applied with equal ease to the breech if required Fig 157 shows the instrument applied to the fœtal scalp By means of a syringe or pump extractor a negative pressure is induced in the cup applicator, thus fixing it to the fœtal scalp or buttock as may be the case The grip is almost unbelievably firm Having personally had the extractor attached to the palm of my left hand and strong suction applied, it was found impossible to pull off the extractor with my right hand This gives a practical indication of the firmness of the grip of the instrument Such a high negative pressure causes some congestion and œdema beneath the area of attachment to the scalp and might suggest that some damage would be inflicted on the scalp, if not the skull also, but this does not appear to be the case The firmness of the grip is increased by the slight œdema induced by the suction The œdema under the suction cap resolves quickly after the suction is removed No complications due to the use of the evacuator are reported In the tropics, where the vitamin C level may be low in some instances, cephalhæmatoma is more commonly encountered than in obstetrical practice in non tropical countries The risk of hæmorrhage in the suction cap area may be slightly higher than that noted in Europe The attendant risk of sepsis in the hæmatoma is, however, small

The Malmstrom instrument consists of a metal suction cap, a traction disc within the cap To the disc a chain is attached which goes through a tubular opening in the top of the cap A transverse metal handle with a vertical metal tube passing through it constitutes the site of fixation of the chain The chain is held in position by a lateral pin The suction cap and the handle are also connected by a length of pressure rubber tubing, the chain passed through the centre of the rubber tubing, thus permitting of both traction and suction being applied through one opening in the suction cap To the other side of the handle another pressure rubber tube is attached This connects the instrument to the negative pressure system A negative pressure gauge and bottle are inserted to show the pressure of suction induced by the pump when the instrument is in use. There are four different sizes of suction cap that can be supplied—30, 40, 50 and 60 mm in diameter The negative pressure can be let off as required by a side valve in the handle The pump used to produce the suction is comparable to that employed in a Potain's aspirator set

Indications for the use of suction extractors are the same as those for obstetrical forceps The instrument has many advantages over metal forceps It is atraumatic to the mother and the child It is not inserted deep into the genital tract so there is less risk of sepsis There is no added risk of intracranial hæmorrhage The instrument does not go over the baby's face as forceps occasionally do The

It has been observed working with many colleagues that there is a marked difference in the rate of occurrence of vesicovaginal fistula following forceps delivery in the tropics with different doctors Why this should be the case is not certain but it is quite apparent Possibly those whose work is followed by a high rate of vesicovaginal fistula rate following forceps delivery undertake cases which others might submit to Cæsarean section The reason is, however, not obvious as the technique of the forceps deliveries has not been observed, the fistula cases being sent at a later date to the surgical department for repair operations Vesicovaginal fistula may sometimes occur in patients with obstructed labour who are relieved by Cæsarean section at a late stage, the bladder trauma being caused by prolonged labour prior to the operation undertaken Following forceps extraction in difficult labour cases, it is a good rule to drain the bladder by an indwelling urethral catheter for three or four days to prevent a rise in intravesical pressure This decreases the risk of sloughing of the vesicovaginal septum, and if a fistula does develop it will probably be much smaller in size than in cases where catheter drainage is not employed It can be concluded that if there is obvious blood in a catheter specimen of urine following forceps delivery that sufficient damage has been done to the bladder to warrant bladder drainage for a few days

Fœtal mortality following difficult labour is almost invariably caused by intracranial hæmorrhage of some sort The risk of cerebral hæmorrhage is greatly aggravated by the use of obstetrical forceps, this accounts for the high mortality An almost greater tragedy is for the mother to find that following difficult labour, assisted by forceps, she has a hemiplegic or spastic child In some instances intracranial hæmorrhage is a precipitating factor in the production of epilepsy in later childhood, which is a permanent social and economic disability as well as a physical defect

The cranial diameters of the fœtal skull are slightly reduced in childbirth by overlapping of the cranial bones The overlapping or moulding anticipated as estimated by Sen [1] is 1 7 mm in easy delivery In low forceps cases the overlap is 1 8 mm With mid forceps, the overlap is 2 01 mm In Cæsarean section cases the overlap is nil to 1 4 mm depending on when the section is undertaken Moulding of the head causing a decrease of biparietal diameter is considered satisfactory up to 1 78 mm The average overlap is considered to be 1 83 mm In cases of blue asphyxia the overlap is 2 27 mm, and where white asphyxia is noted the overlap is 3 30 mm With overlapping beyond 2 mm there is an increasing danger of intracranial hæmorrhage being produced

In view of the acknowledged high risk of forceps delivery to both the mother and the child, the minds of obstetricians have been exercised as to the best design for obstetrical forceps—many designs exist The principle of extraction by an external gripping instrument to the skull necessitates the application of force beyond the greatest diameter of the skull to prevent the instrument slipping on withdrawing the child Skin forceps, such as Willett's, applied to the skin of the scalp, give insufficient traction to withdraw the child with the pull exerted up to the limit at which the skin tears James Young Simpson (of chloroform fame), according to Finderle,[11] first experimented in 1851, in Edinburgh, with suction as

evacuator is easy to apply, it can be attached to either the vertex or the breech It can be used as a means of *rotation of the fœtal skull* if there is a malposition present

The popularity of the suction *type of instrument* is *indicated* by the fact that at the clinic where Finderle practises, metal forceps have been given up since 1950 and replaced by suction apparatus exclusively Between *1950 and 1955*



Fig 157
Malmstrom vacuum extractor in use
(Photograph by kind permission of Professor Tage Malmstrom, Gottenberg, Sweden)

cases delivered by this method amounted to 132 at that clinic There were no complications to the mother or the child attributed to the use of the instrument The instrument can be used without anæsthesia being essential for its employment Delivery approximates much more closely to normal delivery than where forceps are used The instrument of Malmstrom is now in use at Queen Charlotte's Hospital in London, where early comparative studies are being undertaken This instrument would appear *to be the ideal method of fœtal traction* The fact that an anæsthetic is not essential for its use is an added attraction in favour of its *introduction in* tropical obstetrical practice In Africa, where anæsthetic facilities

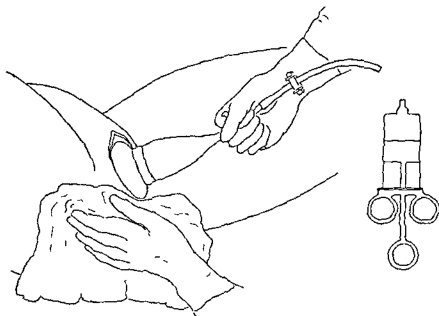


FIG 155
"Suction extraction" method of delivery as used in Eastern Europe
(See text reference Finderle, Petchenko, Chachava, Aristova, and others)

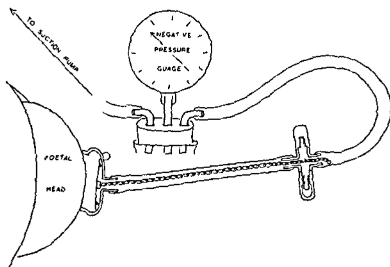


FIG 156
Diagram of Malmstrom vacuum extractor showing the parts and principle.

the bridge of the pubis in cases of obstructed labour would appear to be an instinctive approach to the relief of the urgent situation which has developed How it may best be accomplished is a matter of technique

The operation of symphysiotomy has been practised on rare occasions in Europe during the eighteenth and nineteenth centuries Pubiotomy has been tried as an alternative, but is less popular Gigli s wire saw was made for this purpose originally, although it found more use ultimately in the approach to intracranial operations Sawing of the pubic bone is followed by local callus formation at the back of the pubis and so becomes a danger in subsequent pregnancies Pubiotomy has this disadvantage over symphysiotomy and it is said to be much more difficult to perform—it has never been attempted personally In the early years of the present century Frank[20] presented a series of 117 cases of symphysiotomy at an International Medical Congress in London (1913) There has been a marked increase in the popularity of symphysiotomy in recent years The following series of cases undertaken by individual operators indicates that there is a growing appreciation of this method of relief of obstructed labour in suitable cases in widely differing parts of the world

Argentine (Ramos)	412 cases
Nigeria (Nolan)	179 cases
Spain (Vallhonrat)	161 cases
Ireland (Fenney, Barry and Spain)	100 cases
Ghana (Heelan)	75 cases
Philippines (Baens)	64 cases
Scotland (Greig)	11 cases

The number of cases undertaken indicates only operations performed as reported at various times in obstetrical journals Most of these figures might be greatly increased at the present time, in some cases doubled Having personally undertaken a number of cases of symphysiotomy, some details are given to indicate the points which require comment or which pose some query for those undertaking the operation for the first few times Much assistance has been given by Heelan,[21] who has undertaken quite a large series in Ghana

The operation consists in dividing the symphysis pubis, and a few of the upper fibres of the subpubic ligament, by the least traumatising approach, permitting of separation of the two sides of the pelvis during delivery This operation increases the inlet pelvic, midpelvic and outlet pelvic measurements The child can thus be born with great ease in cases of difficult and obstructed labour due to midpelvic and outlet pelvic obstruction For the sake of brevity a collected list of indications are given which express the consensus of opinion of most of the workers who undertake this operation

1 Primiparæ or multiparæ with midpelvic and outlet pelvic obstruction
2 Following failed forceps where the child is still alive
3 In cases of face, brow and occipito posterior presentations where the position cannot be rectified
4 In primigravidæ with slightly contracted pelvis with early rupture of membranes where the os is at least three fingers dilated

are frequently poor, there is an additional risk by poor anæsthesia given to African patients where a sickle cell crisis may easily be precipitated by a degree of anoxæmia In approximately 20 per cent of the patients a sickle cell trait exists and this accounts for a number of unexpected deaths where it is necessary to employ instrumental delivery for the birth of the child

SYMPHYSIOTOMY—A RATIONAL APPROACH

Forceps delivery, symphysiotomy and Cæsarean section should all have a rightful place as operative procedures for the relief of obstetrical obstruction Forceps delivery is suitable in cases of mild low pelvic or outlet obstruction Symphysiotomy is an operation eminently suited for cases of severe midpelvic obstruction and outlet obstruction where the fœtus is in poor condition and the application of forceps might well take away from it its slender chances of survival The operation has no place in cases of inlet obstruction where the disproportion is so marked that the fœtal head does not enter the pelvis after the onset of labour The operation should not be undertaken if the diagonal conjugate length is below 3¾ in (9 5 cm), as in cases of platypelloid or flat pelvis Cæsarean section should be reserved for those cases where there is inlet obstruction totally precluding the entrance of the fœtal head through the pelvic brim Such cases are noted where the fœtus is unusually large at term or where the fœtus, being normal, is held up by a distorted pelvic brim Pelvic brim distortion of the severe type occurs in cases of osteomalacia, in old poliomyelitis cases with limb wasting and abnormal pressure distribution in ambulation over a long period, and in cases of spondylolisthesis, pelvic brim distortion may also occur, rarely, following severe pelvic fractures If these major rules are observed in cases of difficult and obstructed labour, the fœtal loss will be reduced to a minimum The maternal damage is also greatly reduced by careful selection of cases

There appears to be a natural tendency in the direction of relaxation of the pelvic ligaments during late pregnancy in all female animals In small animals such as the mouse, there is bony rarefaction and separation of the two sides of the pubic symphysis spontaneously, this facilitates delivery This may also be the case with other small animals In human beings, separation of the symphysis pubis occurs spontaneously on rare occasions Such a condition has been seen personally on one occasion (Rotunda Hospital, 1929) Popovic[19] reports three cases of separation of the symphysis pubis in multiparæ who had had previous normal pregnancies "Spontaneous symphysiotomy" occurred in one patient after ten hours in labour, in another after fourteen hours and the last in a patient nineteen hours in labour In 1957 four young African women were seen personally, with my colleague Dr Archambault, who were submitted injudiciously to a crude attempt at symphysiotomy by unqualified native midwives The practice is common in some parts of West Africa The procedure was in all cases unsuccessful and resulted in a complete transection of the urethra followed by severe hæmorrhage A forcible upward cut being made with a short strong knife inserted into the vagina beneath the bridge of the pubis, the incision went through all the soft tissues but did not achieve its object of section of the pubic symphysis To divide

the bridge of the pubis in cases of obstructed labour would appear to be an instinctive approach to the relief of the urgent situation which has developed How it may best be accomplished is a matter of technique

The operation of symphysiotomy has been practised on rare occasions in Europe during the eighteenth and nineteenth centuries Pubiotomy has been tried as an alternative, but is less popular Gigli's wire saw was made for this purpose originally, although it found more use ultimately in the approach to intracranial operations Sawing of the pubic bone is followed by local callus formation at the back of the pubis and so becomes a danger in subsequent pregnancies Pubiotomy has this disadvantage over symphysiotomy and it is said to be much more difficult to perform—it has never been attempted personally In the early years of the present century Frank[20] presented a series of 117 cases of symphysiotomy at an International Medical Congress in London (1913) There has been a marked increase in the popularity of symphysiotomy in recent years The following series of cases undertaken by individual operators indicates that there is a growing appreciation of this method of relief of obstructed labour in suitable cases in widely differing parts of the world

Argentine (Ramos)	412 cases
Nigeria (Nolan)	179 cases
Spain (Vallhonrat)	161 cases
Ireland (Fenney, Barry and Spain)	100 cases
Ghana (Heelan)	75 cases
Philippines (Baens)	64 cases
Scotland (Greig)	11 cases

The number of cases undertaken indicates only operations performed as reported at various times in obstetrical journals Most of these figures might be greatly increased at the present time, in some cases doubled Having personally undertaken a number of cases of symphysiotomy, some details are given to indicate the points which require comment or which pose some query for those undertaking the operation for the first few times Much assistance has been given by Heelan,[21] who has undertaken quite a large series in Ghana

The operation consists in dividing the symphysis pubis, and a few of the upper fibres of the subpubic ligament, by the least traumatising approach, permitting of separation of the two sides of the pelvis during delivery This operation increases the inlet pelvic, midpelvic and outlet pelvic measurements The child can thus be born with great ease in cases of difficult and obstructed labour due to midpelvic and outlet pelvic obstruction For the sake of brevity a collected list of indications are given which express the consensus of opinion of most of the workers who undertake this operation

1 [illegible]
2 [illegible]
3 In cases of face, brow and occipito-posterior [illegible] sition cannot be rectified
4 In primigravidæ with slightly contracted pelvis with early rupture of membranes where the os is at least three fingers dilated

The operation should not be undertaken until the cervical os is fully dilated unless in the exceptional circumstances mentioned in No 4

As to the advantages of the operation, these are numerous both to the mother and the child Not only is the bony obstruction relieved by a permanent increase of all pelvic diameters with the marked opening of the symphysis pubis at the time the operation is undertaken and the child delivered, but there is a permanent increase in all diameters following the operation of not less than 1 cm when convalescence is complete Barry [12] notes a permanent increase in individual diameters following convalescence of the operation as follows

1 Increase in transverse diameter of brim, 1 2 cm
2 Increase in interischial spinous distance, 1 5 cm
3 Increase in interischial tuberous distance, 1 75 cm

An increase in the internal conjugate length is facilitated at the time of delivery, but this cannot easily be measured With increase of the transverse diameter of an approximately circular pelvis the true conjugate diameter should also be increased by 1 cm like that of the transverse length, both being transaxial diameters of the same circle Without symphysiotomy, stretching of the ligaments between the two sides of the symphysis pubis during pregnancy amounts to only 4 6 mm , that is a maximum of ½ cm , or close to it The use of symphysiotomy in suitable cases precludes the necessity for Cæsarean section, with all its attendant risks and disadvantages Symphysiotomy is an excellent operation It deals adequately with the degree of obstruction present where the fœtal head enters the pelvis Following its use there is the tremendous added advantage of a permanent improvement in the pelvic diameters In centres where symphysiotomy is employed freely there is a progressive decrease in the Cæsarean section rate Comparing two maternity hospitals in Dublin where work is carried out under approximately the same conditions in each and the type of patient is similar, it is noted that the greater the symphysiotomy rate the lower the Cæsarean section rate Not only is the immediate obstruction dealt with by symphysiotomy but subsequent deliveries are, in almost all cases, normal Following Cæsarean section the obstruction is not relieved but only by-passed, and precisely the same situation arises with the next pregnancy, necessitating a second Cæsarean section Some women have had as many as eleven Cæsarean sections A woman has the added disadvantage, a uterine scar which is a known potential danger in subsequent labours Barry [12] lays emphasis on the importance of instructing graduates from Asian and African countries in the technique and use of symphysiotomy The operation is pre-eminently suitable in the small type of patient so commonly seen in parts of the tropics The obstruction in this type of patient is dominantly of the midpelvic and outlet type

Feeney [23] writes " The real benefit of symphysiotomy is reaped in subsequent pregnancies " The advice is also given that " If you estimate that it will be necessary, do not leave it too late " The fœtal death rate following symphysiotomy is considerably lower than that following forceps delivery The operation, being undertaken under local anæsthetic, does not carry the added risk of the baby being

and cut with an upward action, so that the top of the symphysis is the part last cut It is the general experience that the fœtal head is born about two pains after the symphysis has been separated it may be with the first pain It is seldom more than three minutes After the symphysis is divided a gauze pack is put into the wound, this prevents blood running over the patient's abdominal wall It is advisable not to suture the wound until after the placenta has been expelled By this time the bleeding will have stopped

The operation is seldom followed by complications of any sort and the maternal mortality is virtually nil Osteomyelitis of the back of the pubis is a theoretical risk, but it seldom occurs Hæmatoma of the vulva may occur Those interested in orthopædics sometimes criticise this disruption of the pelvis as being detrimental to subsequent ambulation Barry reports that he had not seen any difficulty in walking following convalescence Heelan, working in Ghana, was more guarded, and says that the patient may have some discomfort in walking for two to three months This is a minor disadvantage in view of the advantage gained No instances of dyspareunia have been reported following operation Most patients are extremely co-operative during this procedure The results are very gratifying to the doctor and the patient Following the operation the patient is kept lying supine for two weeks Some use a pelvic binder, others do not, considering it unnecessary These patients require slightly more nursing than do Cæsarean section patients following operation During convalescence the symphysis again joins but the final bony gap, as seen on X-ray examination, is found to be about 1 5 cm as opposed to the original 0 5 cm before operation There is a gain of 1 cm at least in the permanent transverse width of the pelvis For a woman to know that following this operation she is unlikely to have any further obstetrical obstruction in subsequent pregnancies is a tremendous additional psychological advantage

CÆSAREAN SECTION IN THE TROPICS

The majority of doctors on arrival in the tropics have never personally undertaken the operation of Cæsarean section up to that time In spite of this lack of experience they may find themselves placed, within a short time, in charge of a very large district where they are expected to be able to deal with all surgical emergency operations with reasonable efficiency Obstructed labour is one of their most serious problems This is largely because they have little or no personal experience of operative obstetrics

Cæsarean section, or removal of the child from the mother by hysterotomy, may be undertaken by four different methods

1 Classical Cæsarean section (transperitoneal)
2 Lower segment Cæsarean section (transperitoneal)
3 Lower segment Cæsarean section (extraperitoneal)
4 Vaginal Cæsarean section (operation per vaginam)

Abdominal Cæsarean section may have to be undertaken in combination with hysterectomy in special circumstances Cæsarean section may also be performed in combination with symphysiotomy

The operation should not be undertaken until the cervical os is fully dilated unless in the exceptional circumstances mentioned in No 4

As to the advantages of the operation, these are numerous both to the mother and the child Not only is the bony obstruction relieved by a permanent increase of all pelvic diameters with the marked opening of the symphysis pubis at the time the operation is undertaken and the child delivered, but there is a permanent increase in all diameters following the operation of not less than 1 cm when convalescence is complete Barry notes a permanent increase in individual diameters following convalescence of the operation as follows

1 Increase in transverse diameter of brim, 1 2 cm

2 Increase in interischial spinous distance, 1 5 cm

3 Increase in interischial tuberous distance, 1 75 cm

An increase in the internal conjugate length is facilitated at the time of delivery, but this cannot easily be measured With increase of the transverse diameter of an approximately circular pelvis the true conjugate diameter should also be increased by 1 cm like that of the transverse length, both being transaxial diameters of the same circle Without symphysiotomy, stretching of the ligaments between the two sides of the symphysis pubis during pregnancy amounts to only 4 6 mm , that is a maximum of ½ cm , or close to it The use of symphysiotomy in suitable cases precludes the necessity for Cæsarean section, with all its attendant risks and disadvantages Symphysiotomy is an excellent operation It deals adequately with the degree of obstruction present where the fœtal head enters the pelvis Following its use there is the tremendous added advantage of a permanent improvement in the pelvic diameters In centres where symphysiotomy is employed freely there is a progressive decrease in the Cæsarean section rate Comparing two maternity hospitals in Dublin where work is carried out under approximately the same conditions in each and the type of patient is similar, it is noted that the greater the symphysiotomy rate the lower the Cæsarean section rate Not only is the immediate obstruction dealt with by symphysiotomy but subsequent deliveries are, in almost all cases, normal Following Cæsarean section the obstruction is not relieved but only by-passed, and precisely the same situation arises with the next pregnancy, necessitating a second Cæsarean section Some women have had as many as eleven Cæsarean sections A woman has the added disadvantage, a uterine scar which is a known potential danger in subsequent labours Barry [12] lays emphasis on the importance of instructing graduates from Asian and African countries in the technique and use of symphysiotomy The operation is pre-eminently suitable in the small type of patient so commonly seen in parts of the tropics The obstruction in this type of patient is dominantly of the midpelvic and outlet type

Feeney [23] writes " The real benefit of symphysiotomy is reaped in subsequent pregnancies " The advice is also given that " If you estimate that it will be necessary, do [illegible]

is considerat

undertaken u

to the lower segment at a very low level The incision tends to have a somewhat slanting angle rather than absolutely transverse, but this does not matter At the time of operating it was not known that the method had already been described in Italian journals It had been adopted in Italy for the reason already suggested The advantage of extraperitoneal Cæsarean section is that the peritoneal cavity not being opened, infection does not enter it The major complication of intraperitoneal sepsis is thus avoided, reducing the morbidity and mortality accordingly

Whereas it is generally acknowledged that the transperitoneal lower segment section is the method of choice, the procedure undertaken initially is usually that which has been seen in the teaching school with which one was associated The older classical Cæsarean section procedure is still more popular in some parts of Europe than the lower segment operation It is noted that many doctors trained on the continent of Europe frequently use classical section by option Kapustina [28] notes that classical section is favoured in Russia and that local anæsthetic is used exclusively It is unwise to be dogmatic as to which operation should be employed All varieties have their particular special application and advantages as well as disadvantages Personally, a lower segment section is favoured in straightforward cases of timed Cæsarean section and in women in good condition in early labour The fœtal head is high and the lower segment very accessible In some cases the classical operation is undoubtedly more suitable, examples of its greater suitability being where there is a placenta prævia It is unwise to cut through the placental site if this can easily be avoided In cases where a woman has already had two or more lower segment Cæsarean sections there may be massive adhesions present low down on the uterus, and in these cases a classical is undoubtedly more sensible To these indications for the classical operation may be added the fact that in cases of midpelvic obstruction, where the fœtal head has descended to a low level and is very tightly jammed in the pelvis, a lower segment section may be well-nigh impossible, and this would appear to be another good reason for adopting the classical operation In cases where there are enormously enlarged veins about the lower segment of the uterus it is inadvisable to cut through these, and an upper segment or classical operation is more suitable A classical Cæsarean section can be undertaken more quickly than a lower segment section, and for this reason it is favoured in cases where the fœtus is in a very distressed or poor condition—the factor of speed being important in these cases to the welfare of the child Opinion varies somewhat as to the frequency of rupture of the uterus after the different types of operation It is generally conceded that classical Cæsarean section is more liable to predispose to uterine rupture with a subsequent labour than the scar of the lower segment procedure Opinion on this point is, however, not unanimous The term " vaginal section " is sometimes used for the operation of multiple cervical incisions carried out per vaginam It is occasionally carried out for cases of gross cervical fibrosis which causes a hold-up in the second stage of labour where there is no other obstructive condition interfering with advance in labour Four equiplaced incisions, each of 1 cm long, are placed in the intravaginal part of the uterine cervix at positions 2, 4, 8 and 10 o'clock By these incisions cervical relaxation is afforded and the infant can then be born where

Personal experience suggests that women in the tropics do not have easier labours than women in non-tropical countries Sandford[26] reports the interesting case of an African woman who, being *in extremis* with obstructed labour, opened her own abdominal wall and the uterus with a razor and removed the fœtus Following this she was admitted to hospital After cleaning and closure of the abdomen she recovered following a stormy convalescence Classical Cæsarean section, or opening the womb through a vertical incision placed in the upper segment of the uterus, was the standard operative procedure in Cæsarean section until about 1912 Since that time lower segment section (transperitoneal) has been undertaken with increasing frequency following the work of Marshall[27] His monograph on the subject is most instructive and clearly written With the lower segment section the incision in the uterus is placed transversely at a position only a little above the level of the reflection of the peritoneum from the back of the bladder on to the uterus At this level the lower segment is thin and stretched The uterine incision in this operation was originally made in the transverse direction and straight across The incision has been modified somewhat into the shape of the arc of a circle with the convexity downwards This permits of a wider opening without the incision encroaching unduly on the position of the major uterine blood-vessels In this way the removal of the fœtus is facilitated and there is less likelihood of severe hæmorrhage occurring due to tearing of the incision laterally, when the fœtal head is being extracted

In late cases of severe obstructed labour the operative risk in Cæsarean section by the transperitoneal operation is greatly increased with the onset of infection in the amniotic cavity Because of this risk the method of opening the uterus by the extraperitoneal route was devised, the abdominal wall being incised down to but not including the peritoneal cavity The peritoneum is carefully separated from the lateral and superior aspects of the bladder over the lower uterine segment, through the exposed area the uterus is opened This operation is difficult and takes considerably longer to perform than the transperitoneal operation In about 20 per cent of the cases the peritoneal cavity is perforated inadvertently, it being in an œdematous and unhealthy condition because of the congestion associated with the obstructed labour Having undertaken many of these operations it was noted that the tear, if such occurred, invariably took place close to the middle line at the back of the bladder At this position the peritoneum is very firmly adherent to the bladder itself and the uterus in the middle line In the lateral position it separates off quite easily both from the bladder and the side of the uterus, it can easily be pushed back without the risk of tearing If the peritoneal cavity is perforated the object of the operative approach is defeated, as infection will almost certainly enter the peritoneal cavity If the peritoneum is torn it can be sutured, but being œdematous the sutures sometimes pull through, making the rent worse Having found the lateral part so much easier to separate, the method of not attempting to remove the peritoneum from the middle line at the top of the bladder was adopted The peritoneum was separated more extensively in the anterolateral position and in the middle line from below the bladder upwards to the position where it is very adherent In this way the bladder being freed laterally on both sides and below can be retracted laterally and upwards, allowing of access

of the tropical world Extensive vaginal scarring and stricture also occurs very commonly in cases of long-standing vesicovaginal fistula, due to an earlier difficult labour When the woman again becomes pregnant, whether the fistula has been repaired or not, a Cæsarean section is frequently necessary for delivery These cases are very seldom seen in Northern Europe, but they are still very common in parts of the tropics where maternity services are inadequate Lymphogranuloma and associated vaginal scarring occasionally causes obstructed labour Stricture of the lower third of the vagina is reported to occur in cases of introcision Severe soft tissue obstruction occurs in cases of extensive female circumcision with infibulation (Laycock [29]) Childbirth below the age of 14 years predisposes to difficult labour due to immaturity of the mother Such cases are more commonly seen in the tropics than in Europe Asirifi [30] undertook four Cæsarean sections in one year in Togoland in pregnant young girls under the age of 13 years, they had never menstruated and there was no breast development A condition frequently seen in the tropics, but encountered hardly at all in non-tropical areas, is extensive condyloma acuminata about the vulva It becomes extremely extensive and grows very rapidly, particularly during a pregnancy In some instances it is so extensive that vaginal delivery is precluded Fig 112, Chapter 7, shows a photograph of such a case This is a highly dangerous condition in pregnancy, particularly if it is allowed to advance up to the time of delivery The risk of a Cæsarean section becoming infected when this condition is present is very high

Benschine and Brooklyn [31] reported three cases of extensive condyloma acuminata seen late in pregnancy In the first case there was spontaneous delivery followed by gross sepsis and death of the mother In the second case delivery was by Cæsarean section but gross sepsis followed and the patient was in hospital with a stormy convalescence for forty days In the third case the mass was excised one month before full term, causing extensive damage to the vulva If cases are discovered sufficiently early it is likely that the use of "triple sulpha cream," as reported by Baker,[32] would bring the infection under control within three to four weeks, the cream being applied twice a day followed by a vaginal douche containing vinegar If this condition is discovered only at the time of the onset of labour it is considered that the best chance of undertaking successful Cæsarean section without infection of the wound and deep tissues is to clean the abdomen very thoroughly with a detergent solution and follow this with an application of 1 per cent biniodide of mercury in spirit The abdomen is then dried with a sterile towel, carefully avoiding the infected area Mastisol glue is then applied to the lowermost 2 in of the abdomen from one side to the other and to this a sterile towel is stuck on with firm pressure, as is done in brain operations where sterile towels are stuck on to the scalp adjacent to the position for the skin incision before the skin is incised If a towel is not fixed by some form of adhesive, infection is liable to be carried from the upper part of the vulva on to the lower part of the abdominal wound If mastisol glue is not available, a wide piece of elastoplast or an 8 in -wide strip of sellotape may be used and a further sterile towel clipped on over and above them, as these materials will not be sterile Further towels can then be suitably placed, permitting of the skin incision while covering the other

the obstruction was due to the fibrotic cervix alone This operation is seldom undertaken, but has been employed on a few occasions with satisfactory results

There are many indications for Cæsarean section, though the number of women requiring Cæsarean section for delivery does not usually exceed 5 per cent The percentage incidence noted in statistics depends on many circumstances Brief consideration is given to the indications for Cæsarean section

Undoubtedly this operation, by whichever abdominal method used, is indicated in cases of gross inlet pelvic obstruction where the fœtal head does not enter the pelvic cavity with the onset of labour Cæsarean section is necessary in cases where a transverse position of the fœtus cannot be rectified In some instances an abnormally large but quite normal child necessitates Cæsarean section where the maternal measurements would be adequate for delivery of a child of average size In some of these cases the woman has had a previous normal vaginal delivery without difficulty It is noted during the past twenty years that African children born in large towns tend to be of a higher average birth weight than formerly This probably depends on the fact that the general standard of nutrition of the mothers is improving in the large centres where imported food supplies are well organised and the economic position of the people permits of the purchase of a wider range of foodstuffs The position is little changed in remote country districts In the case of elderly primigravidæ over the age of 35 years, with rather low pelvic measurements, it is sometimes advisable to undertake a timed Cæsarean section at term because of the patient's age and the necessity of avoiding undue risk to the woman's first child conceived late in the child-bearing period Cæsarean section is advisable in most cases of breech presentation with extended legs If vaginal delivery is attempted, labour is usually very prolonged Cæsarean section is not indicated in all cases of placenta prævia Section is not essential where the placenta is in the low lateral position and the woman is in good condition and without undue loss of blood If the uterine os dilates to three-quarters of its size it is usually possible to perform an internal version, bringing down a leg Some weight traction is then applied as labour advances In cases of severe eclampsia, with recurring fits, where the woman's condition is showing some deterioration, Cæsarean section is advisable Section operation is necessary in cases of severe dystocia, due to hydrocephalis, where the head is abnormally large It is also indicated where there is gross distortion of the mother's pelvis, as in cases of osteomalacia, spondylolisthesis and as a result of long-standing hip disease or leg deformity such as poliomyelitis with abnormal weight-bearing Fœtal monstrosities give rise to obstetrical obstruction in approximately 30 per cent of cases Many monstrosities, including conjoined twins, are born without causing undue difficulty or prolonged labour If a monstrosity is diagnosed, a timed Cæsarean section is justifiable The above indications for Cæsarean section are noted in all parts of the world There are, however, some further indications which might be termed characteristic of the tropics

A fibrotic uterine cervix which will not dilate adequately is seen much more frequently in the tropics than in non-tropical areas This is probably associated with gross cervical infection followed by formation of fibrous tissue Fibrous strictures of the vagina give rise to much obstetrical obstruction in some parts

Cæsarean section rate is an important factor in deterring a patient from entering hospital in the tropics for delivery of any kind, normal or otherwise: the patients fear that a Cæsarean section may be undertaken in cases where it is not essential.

The matter of anæsthesia for Cæsarean section is important. The type of anæsthetic depends to a considerable extent on the facilities available, the attendance or otherwise of a trained anæsthetist as well as the condition of the mother and the child. If the condition of the mother and the child is good a short general anæsthetic is satisfactory, but it should not be started until the surgeon and the nurses are quite ready to begin the operation. If this is done, no time is wasted nor is the anæsthetic unduly prolonged by the time the baby is removed from the abdomen. If the condition of the infant is poor, a general anæsthetic is contraindicated. If the child is removed from the uterus in poor condition with the additional disadvantage of being partly anæsthetised, initiation of respiration can be very difficult, with a high risk to the infant. Low spinal anæsthetic is excellent for Cæsarean section, but great care must be taken that the mother has an adequate blood-pressure. Low spinal anæsthesia interferes very little, if at all, with the mother's blood pressure, but a small dose of ephedrine, such as ½ gr., is advisable. Here, again, ephedrine in itself may be dangerous if the mother's pulse is very fast. Spinal anæsthetic should therefore only be used in cases where the mother's condition can be classed as good. Spinal anæsthesia is an advantage in that the child breathes very easily on being removed from the uterus. Carman,[34] summing up the essential risks associated with anæsthesia in Cæsarean section, notes sub-oxygenation, hæmorrhage and a fall in blood pressure as being the most important. Low spinal anæsthesia has many advantages in these respects: it gives excellent muscular relaxation and it is not toxic to the liver. Hæmorrhage is very low where spinal anæsthesia is used and uterine contraction is rapid and effective. Most of the Cæsarean sections undertaken personally have been performed using low spinal anæsthesia. Light spinal anæsthetic has a disadvantage in that it necessitates tilting the patient into the slight Trendelenburg position, and with some degree of respiratory embarrassment already present due to the abdomen being so full with the pregnancy the patient may find great difficulty in breathing in this low head position. Local anæsthesia is suitable for Cæsarean section in many cases. It is used almost exclusively at many clinics on the continent of Europe. Personally it is not considered the anæsthetic of choice. This is particularly the case where the fœtal head has reached the midpelvis and is firmly jammed in that position. Local anæsthesia is adequate for the abdominal wall but it is not possible to prevent the discomfort caused to the mother by a firmly fixed head being dislodged from the pelvis. It is an advantage to give the patient the local anæsthetic first and immediately before the operation is started she should be given a dose of intravenous pethidine (50 mg.). This does not depress the respiration of the baby and is a great advantage in alleviating the mother's feelings of tenseness and anxiety attendant on any operation undertaken while the patient is still awake. Ashworth,[35] working in Ghana with very limited facilities, found that intravenous pethidine (50 mg.) given just before the operation starts, followed by intravenous pentothal (1 gm.), was quite adequate and satisfactory for

parts of the patient The abdominal incision might with advantage be placed a little higher than is usual for Cæsarean section cases Following the operation the wound should be completely covered with elastoplast over a small dressing, particularly at the ends of the incision, to prevent infection entering

The Cæsarean section rate varies greatly in different stations There are many reasons for this If only abnormal obstetrical cases are admitted to hospital, and no normal cases are taken in, the Cæsarean section rate will obviously look extremely high, relative to total deliveries If the same number of section operations are undertaken in a fixed similar period, but a large number of normal cases are admitted in addition, the percentage Cæsarean section rate to total deliveries is greatly reduced although there is no difference perhaps in the number of Cæsarean sections undertaken in that district In the early stage of any medical service in the tropics there is a great tendency to admit cases of advanced illness only and cases of difficult and obstructed labour This makes the Cæsarean section rate reported look very high The section rate is also influenced by the criteria by which the necessity of the operation is judged Where the procedure of symphysiotomy is employed the Cæsarean section rate decreases very considerably, symphysiotomy being employed in cases of midpelvic arrest which might otherwise be relieved by Cæsarean section The experience and judgment of the operator also influences the choice of procedures Cæsarean section being a comparatively easy operation, giving quick spectacular results, may easily be employed without due consideration and in cases where it is not essential To lower an unduly high Cæsarean section rate in Bombay, Dadabhoy [33] reports that it became advisable to introduce a new rule in the obstetrical department of the hospital making it compulsory to have a second opinion in all cases where, in the opinion of one doctor, Cæsarean section was indicated Following the introduction of this new rule, "Consultation before Cæsarean section always," which is an excellent one, the Cæsarean section rate decreased markedly At one large station in West Africa the same rule was introduced of necessity and the Cæsarean section rate fell to one-quarter of the level noted before its introduction It is frequently observed that if the Cæsarean section rate is compared in the upper and the lower wage-earning groups of any community, the section rate is invariably higher in those placed in a better economic position This may be accounted for in several ways The more prosperous type of patient tends to demand Cæsarean section where the operation is not essential on scientific grounds Unfortunately economics may overrule science in such cases and an unwise decision to operate is made not entirely on scientific grounds Where X-ray facilities are available, judgment may be based on the photographic appearances alone, but the X-ray appearances are sometimes very deceptive clinical judgment may often be more accurate If the disproportion is so great that the head of the fœtus does not enter the pelvis with the onset of labour, Cæsarean section is obviously necessary If the head enters the pelvis and the diagonal conjugate is not less than 4 in , and the subpubic angle not below 84 degrees, a trial labour is justifiable if the position of the fœtus is normal and good If there is midpelvic or low pelvic arrest, symphysiotomy or forceps delivery may be employed Cæsarean section is seldom necessary in these cases, though it is frequently resorted to It should be remembered that an unduly high

Cæsarean hysterectomy is used on rare occasions where there is an obstetrical obstruction associated with tumour formation in the lower uterine segment The operation is also sometimes used in cases of rupture of the uterus which are treated surgically, the infant being removed through a Cæsarean section type of incision in the uterus and then the complete organ removed

RUPTURED UTERUS AND ITS TREATMENT

Rupture of the uterus in childbirth is caused essentially by unrelieved obstructed labour It may also be caused by operative procedures or manipulations calculated to relieve cases of difficult and obstructed labour A small proportion of the cases are of traumatic origin, as seen in pregnant women who sustain a lorry accident, or a severe fall late in their term In remote areas of the tropics, where no skilled obstetrical aid is easily available, cases are still seen where very violent pressure is applied to the abdomen as a last resort in an effort to effect delivery Such a procedure is invariably followed by rupture of the uterus and decease of the mother and child

Classification of the causes of obstructed labour have already been considered and are therefore not reiterated in detail Rupture of the uterus seldom occurs in the first twenty-four hours of labour The time of highest incidence of this condition is the thirty-fifth hour after the onset of labour At this time a high proportion of the cases occur if the obstruction is not relieved Weakness of the uterus is predisposed to by the presence of an old Cæsarean section scar, either in the body of the uterus following the classical operation, or in the lower segment following operation by that route If for any reason an attempt at version is made to facilitate extraction of the child after prolonged labour, there is grave danger of uterine rupture Having had this accident happen personally, the ease with which it may occur is more fully appreciated Fortunately in the case where this happened a laparotomy was immediately undertaken and the fœtus removed through the abdomen The uterus was repaired and the woman recovered Uterine rupture is a very real danger in cases of intra-uterine manipulations attempted at a time when the woman has been more than twenty-four hours in labour At this stage the uterus is usually in a tonically contracted state and most of the amniotic fluid has drained away The accident may happen if an attempt is made at a late stage to rectify a malpresentation of the head, particularly one of the occipito-posterior type, or where it is inadequately flexed Rupture was seen in a case where injudicious force was used to adjust the blade of the obstetrical forceps This is particularly likely to happen where a high forceps delivery is attempted at a time when the cervix is not yet quite fully dilated A forceps blade injury is most likely to occur in the position of the right lateral fornix where the upper part of the blade gets caught between the thin lip of the uterus which is not yet quite fully opened and the top of the vagina, such a tear might be more correctly termed a "colporrhesis" A case of this sort was encountered in England in 1933 The woman was sent to hospital in very poor condition following this accident. She recovered, following Cæsarean hysterectomy.

anæsthesia in Cæsarean section in country stations where the services of a skilled anæsthetist were not available. The patient should be ready, and the abdomen cleaned and towelled and the surgeon waiting to start the operation before the injections are given The baby can then be removed as quickly as possible so that it is not adversely affected by the pentothal used It is advised that when Cæsarean section is being undertaken that the patient should be given oxygen through a mask irrespective of the type of anæsthesia used—general, spinal, local or intravenous Because of the pregnancy within the abdomen, respiration may be somewhat difficult and oxygenation deficient The condition is aggravated by the patient having to assume the lying-down position during the operation If general anæsthesia is used it is easier if oxygen is available It is also very advisable to give oxygen in cases of patients of African origin who may have a sickle cell trait present The presence of the oxygen decreases the risk of precipitating a sickle cell crisis When oxygen is given during spinal or local anæsthesia, respiration is easier, breathing being entirely dependent on diaphragmatic and thoracic respiration during the time the abdomen is open Good oxygenation is an advantage both to the mother and the child

Timed Cæsarean section before the rupture of the membranes seldom gives rise to complications If, however, the membranes have ruptured and labour proceeds for a prolonged time before section is undertaken, there is a high risk of sepsis developing and convalescence is not always easy, due to a low-grade infection within the peritoneal cavity Fortunately, with the advent of antibiotic drugs, such complications are now much less often seen than formerly Aragon and Baja Panlilio,[36] working in the Philippine Islands, commenting on the morbidity and mortality rates following Cæsarean section between 1945 and 1951, noted the following results

Type	Number	Deaths	Mortality
			Per cent
Lower segment section	510	21	4
Classical section	141	9	6
Extraperitoneal	86	5	6

Following Cæsarean section there is always the potential risk of rupture of the uterus with a subsequent labour due to the possible weakness of the uterine scar This is a permanent disadvantage of Cæsarean section which must be reckoned against the immediate advantage gained when advising the operation in the first instance Cæsarean section avoids cerebral birth injuries in the infant, and this must be considered particularly in cases of elderly primiparæ The infant breathes more quickly and lustily following the operation undertaken using spinal or local anæsthesia than when general anæsthesia is employed

Cæsarean section must never be considered as an easy way out for the mother, the baby and the doctor, but employed and applied only after very careful consideration regarding the disadvantages as well as the advantages

pregnancy is not considered here The degrees of rupture of the uterus due to labour are classified into

1 Cervical tear only
2 Extraperitoneal rupture
3 Intraperitoneal rupture

Certain definite predisposing causes are noted A cervical tear alone is seldom classed as a rupture of the uterus, though it is essentially so Lesser cervical tears are so common with normal pregnancy that they are considered to be *within* normal physiological levels Extraperitoneal rupture of the uterus in obstructed labour is seen in cases where the lower segment tears, probably as a result of an extension of an old cervical tear. *This extends up through the lower segment of* the uterus The peritoneum over this area frequently does not give way A large extraperitoneal hæmatoma develops and in these cases there is less marked shock than is seen where the rupture is intraperitoneal Why the tear should be so frequently on the left side is not certain, but it is noted to be so by many workers In all cases of extraperitoneal rupture personally noted the tear has taken place on the left side The number of cases seen personally of this type amounts to over forty Nolan,[40] working in Nigeria, also notes the preponderance of rupture on the left side Menon [41] reported five cases of a tear at the back of the vagina at its junction with the uterine cervix, which is a condition which might be classed with uterine ruptures It is certainly an allied obstetrical accident A tear of the uterovaginal junction of this type is not common It is usually caused by faulty technique in the insertion of obstetrical forceps Rupture of a Cæsarean section scar of either type is a well recognised sequel to a previous operation This risk is a hazard associated with Cæsarean section undertaken alone for the relief of obstructed labour It is generally agreed that the classical operation has a greater predisposition to a subsequent uterine rupture than that found where the lower segment operation has been undertaken Most authorities consider that the risk is about three times higher when the classical operation is used as opposed to the lower segment operation Dadabhoy [33] noted, in a large series of cases, that the *classical scar rupture rate was many times higher* than the rate *noted when the* lower segment operation was used During a recent tour of country hospitals in the northern territories of West Africa spontaneous rupture of the uterus was *noted to have been admitted to all hospitals with varying frequency during the* past twelve months Uterine rupture in obstructed labour is still a very common condition in the tropics In 1942, in a large station in West Africa, thirty-six cases of ruptured uterus were admitted in one year, that is, one *every ten days* Fortunately this enormously high instance has since been decreased considerably with improvement in obstetrical services The percentage incidence of rupture of the uterus relative to total deliveries in the hospital gives no *clear indication* of its frequency in a district The figures are influenced by the proportion of normal cases admitted to the hospital relative to abnormal cases treated as in patients

In many tropical hospitals abnormal midwifery cases alone are admitted The hospital frequently is considered by the people to be a place where patients

Cases of traumatic rupture of the uterus with early decease following a lorry accident are usually noted post mortem In these cases there is usually a very rapid loss of maternal blood into the peritoneal cavity as a result of the rupture The placenta almost invariably separates completely from the wall of the uterus In one such case following an accident which occurred outside the hospital entrance the patient was admitted within a few minutes of the accident, but in a moribund condition She was unconscious Immediate preparations were made to undertake a post-mortem Cæsarean section with a view to preserving the life of the child if possible On opening the abdomen, which contained several pints of loose blood, the fœtus was found to be dead This is almost invariably the case because of separation of the placenta from the uterus The infant dies of anoxia

Signs and symptoms of rupture of the uterus are usually quite clear-cut The woman has invariably been in labour over thirty hours After continuing strong labour pains she then suffers from a very severe " tearing-like pain " in the lower abdomen. The labour pains cease following this catastrophic pain and a severe dull ache about the pelvis and the hips remains Marked shock rapidly develops There is a rise of pulse, marked sweating, some air hunger and attacks of vomiting There is usually marked bleeding per vaginam On palpating the abdomen the smooth rounded contour of the uterus is replaced by an unusual irregular feeling Quite commonly the impression is gained that one is feeling two fœtal heads, one on each side of the umbilicus This is invariably due to escape of the fœtal head, or the breech through the rent in the uterus, most commonly on the left side The contracted uterus formed into a ball-like mass about the size of a fœtal head is felt to the opposite side of the middle line As a result of rupture of the uterus where the tear involves the lower part of the uterus and the peritoneal cavity is not opened—extraperitoneal tear—a state of surgical emphysema may be noted in some instances about the suprapubic and prepubic regions There is an escape of gas into the extraperitoneal cellular tissues which spread about the bladder area When this happens there is a sense of crackling or bubbles in the tissues very like gas gangrene or surgical emphysema, as seen following chest injuries with implication of the lungs Kurchin,[37] working in Russia, has recently described this sign as being of particular value It is quite frequently present though perhaps seldom looked for It has been noted many times in African patients It is very valuable as a sign of uterine rupture if present On rare occasions, as described by Gupta,[38] there is a " silent rupture ' of the uterus Where no conspicuous episode occurs suggestive of the onset of a tear, the woman drifts slowly into a state of marked shock and the rupture is not infrequently found at post mortem Vasiljevic [39] noted a case where there was a silent rupture of the uterus with extrusion of the unruptured amniotic membranes into the abdominal cavity It must be concluded in such cases that there is an inherent weakness about the wall of the uterus to permit of an early rupture at a comparatively low uterine pressure, which is insufficient to rupture the membranes Such a condition might presumably occur following the rupture of a very weak uterine scar, resulting from a previous Cæsarean section The site of uterine rupture is a matter of considerable interest and importance. Uterine rupture associated with early

the operation wound following the original operation and presumably in the uterine scar also

Treatment of rupture of the uterus of any sort is a challenge to the skill of an obstetrician Before the use of antibiotic drugs the mortality rate of rupture of the uterus, treated operatively, was in the level of 75 per cent At that time conservative operative measures or local repair was seldom followed by success This was due to gross infection which could not be controlled adequately Cæsarean hysterectomy was therefore almost invariably attempted A Cæsarean hysterectomy operation performed on a woman who has lost a lot of blood and is in a very shocked condition is almost a prohibitive risk The risk is much reduced by a preliminary blood transfusion started before and continued during the operation It is, unfortunately, sometimes extremely difficult to get donor blood from relatives *in the tropics* Antibiotic drugs should also be given Whereas Cæsarean hysterectomy may be a life-saving procedure, it almost inevitably produces a patient who suffers perpetual misery as a result of the loss of menstruation The psychological disturbance associated with hysterectomy in a young woman in the tropics is profound She feels rejected, unwanted by her family or her husband and a subject of ridicule Under these circumstances hysterectomy should not be undertaken other than in exceptional circumstances The mortality rate for [illegible] h the patient s first seen the facilities [illegible] blood

		Per cent Mortality
1	Cæsarean hysterectomy—no antibiotics, no transfusion	75
2	Cæsarean hysterectomy—with antibiotics, no transfusion	50
3	Cæsarean hysterectomy—with antibiotics and transfusion	33
4	Repair uterine tear—with antibiotics and transfusion	20

A conservative repair of the uterine tear carried out on opening the abdomen using a few ' through and through sutures and if necessary the application of a gauze pack as suggested by Ebden,[48] gives the best recovery rate The procedure is also simple and within the capabilities of those with limited surgical experience The gauze put in as a roll pack, down to the uterine tear, is removed in two stages at twenty four hours and forty eight hours [illegible]

the pelvic measurements are poor the procedure of [illegible] with symphysiotomy as advised by McVey [5] should be adopted By this means the bony pelvic measurements are permanently increased by not less than 1 cm in all diameters The most adverse criticism of Cæsarean section alone is that it deals with the present without any benefit in later pregnancies There is the additional disadvantage of a weak uterine scar with risk of uterine rupture

go only if *in extremis*, when they are unable to deliver at home after a prolonged trial labour Obviously in these circumstances rupture of the uterus will be seen very commonly and the annual returns show a very high percentage incidence relative to total deliveries The percentage incidence of admission of ruptured uterus relative to total deliveries in different areas is found to be

	Deliveries	Per cent
Harris and Angawa,[42] East Africa	1 in 117	0 85
Nolan,[13] Nigeria	5 in 729	0 68
Lawson and Lister,[43] Ibadan, Nigeria	35 in 5582	0 63
Montgomery,[41] East Africa	1 in 300	0 33
Austria,[45] Philippine Islands—		
Area A	1 in 743	0 13
Area B	1 in 331	0 30
Area C	1 in 52	1 92
Thompson,[46] Rotunda Hospital, Dublin (comparison)	3 in 5469	0 055

The percentage incidence depends entirely on the circumstances and conditions in which the work is undertaken A high percentage incidence is not necessarily derogatory to the standard of the maternity work performed All circumstances must be taken into consideration Working in the tropics it is found that the number of spontaneous uterine ruptures during labour greatly exceeds the number seen due to rupture of a Cæsarean section scar It is difficult to determine all the factors which account for the high incidence of left sided uterine rupture In cases of left sided rupture extending up from the cervix into the body of the uterus it has been noted in a high proportion of the cases that there is a marked scarring of the upper third of the vagina on the right side This is considered to be the result of the use of irritant tampons placed within the vagina The tampons, being most frequently pressed into the right lateral fornix by the right hand of the patient, these cause marked burning and ulceration followed by scar tissue formation about the right lateral fornix particularly, the fornix, in some cases, being completely obliterated on that side. The left side of the cervix may be in an undamaged state or certainly less involved in most cases This permits of expansion on the left side during labour but not on the right side With over-expansion it is much more likely to rupture on the left side The reason for the discrepancy in incidence of rupture of Cæsarean section scars is thought to be that there is obviously a much higher risk of the placenta occupying the area under the old scar when a classical operation was performed than where the lower segment operation was performed The incidence of lowly placed placenta or placenta prævia of varying degrees does not exceed 2 per cent of pregnancies For this reason possibly the percentage of ruptures following classical section is higher than where the lower segment section is employed The placenta, with its enormous blood supply and infiltrating physiological character, possibly predisposes to increased local softening of the old scar Vasilevski,[47] analysing a large series of cases of rupture of the uterus secondary to Cæsarean section scars, noted from old records that in a high proportion of the cases there was evidence of infection in

38 GUPTA, U P (1956) Rupture of the uterus in labour *J Obstet Gynaec India*, 7, 83
39 VASILJEVIC, V (1956) Rupture of the uterus with intact amnion *Med Rev Serb med Ass* (Yugoslavia), 9 164
40 NOLAN, M M (1954) Obstetrical problems in Nigeria *Irish J med Sci* p 205
41 MENON, K K K (1952) Colporrhexis *J Obstet Gynaec India*, 2, 129
42 HARRIS, B P & ANGAWA, J O W (1951) Rupture of the uterus in East Africa *J Obstet Gynaec Brit Emp* 58, 1030
43 LAWSON, J B & LISTER, U G (1954) *Clinical Report Dept Obstetrics* Ibadan University College
44 MONTGOMERY, J (1955) Some aspects of obstetrics in the African *Cent Afr J Med* 1, 10
45 AUSTRIA, S (1955) Rupture of the uterus with report of three cases *J Philipp med Ass* 31, 179
46 THOMPSON, E W I (1957) Rotunda Hospital Report Statistics *Irish J med Sci* p 74, etc
47 VASILEVSKI, G K (1958) Rupture of the uterus along the cicatrix after Cæsarean section *Akush Ginek (U S S R)*, 2, 46
48 EBDEN, B E (1928) A case of rupture of the uterus with recovery *W Afr med J* 1, 76

REFERENCES

1 Sen, N C (1953) A report on birth weight and head dimensions of Indian babies *J Obstet Gynaec India*, 3, 233

2 Sen, N C (1953) A report on the Indian female pelvis *J Obstet Gynaec India*, 3, 172

3 MacGregor, V J G (1955) Deformity of pelvis in pregnant women in the Gold Coast *W Afr med J* 4, 149

4 Shah, K C (1952) Disturbances of calcium metabolism during pregnancy *J Obstet Gynaec India*, 2, 177

5 Devi, P K (1955) Two cases of hydatid cyst of the pelvis *J Obstet Gynaec India*, 6, 203

6 Knight, H K (1957) Obstetric emergencies *Cent Afr J Med* 3, 303

7 Shlepkov, B I (1957) Novocain in dystocia *Akush Ginek (U S S R)*, 4, 14

8 Purandare, N A (1952) Perineal measurements at the time of delivery of the head *J Obstet Gynaec India*, 3, 45

9 Adatia, M D (1955) Painless labour *J Obstet Gynaec India*, 5, 371

10 Doolan, W (1949) Dublin surgery 100 years ago *Irish J med Sci* p 97

11 Feeney, J K (1956) Report Coombe Maternity Hospital—Symphysiotomy *Irish J med Sci* p 61

12 Barry, A P (1955) Report National Maternity Hospital—Symphysiotomy *Irish J med Sci* p 13

13 Nolan, M M (1956) *Report of St Luke s Hospital*, Anua, Uyo, Nigeria

14 Finderle, V (1955) Extractor instead of forceps *Amer J Obstet Gynec* 69, 1148

15 Malmstrom T (1957) The vacuum extractor *The Midwives Chronicle and Nursing Notes*, 70, 184

16 Petchenko, A I (1957) New method of promoting and concluding labour *Akush Ginek (U S S R)*, 6, 15

17 Chachava, K V (1957) The use of vacuum extractor instead of obstetrical forceps *Akush Ginek (U S S R)*, 6, 11

18 Aristova, V N (1957) Application of suction extractor in gynæcology *Akush Ginek (U S S R)*, 6, 21

19 Popovic, Z (1953) Injury of pubic symphysis during spontaneous delivery *Med Rev Serb med Ass* 6, 365

20 Frank, O (1913) *Proceedings International Congress, Section 8, London*, Pt 2, p 13

21 Heelan, F D (1957) Personal Communication—Symphysiotomy Ghana

22 Barry, A P (1955) Report National Maternity Hospital—Symphysiotomy *Irish J med Sci* p 14

23 Feeney, J K (1957) Report Coombe Maternity Hospital—Symphysiotomy *Irish J med Sci* p 65

24 Barry, A P (1953) Report National Maternity Hospital—Symphysiotomy *Irish J med Sci* p 19

25 McVey, H (1955) The treatment of disproportion by combined lower segment Cæsarean section with symphysiotomy *Irish J med Sci* p 299

26 Sandford, A R (1951) Self inflicted Cæsarean section *E Afr med J* 28, 254

27 Marshall, M (1939) *Cæsarean Section—Lower Segment Operation* Bristol Wright

28 Kapustina, Z A (1957) Cæsarean section *Akush Ginek (U S S R)*, 3, 96

29 Laycock, H T (1950) Surgical aspects of female circumcision in Somaliland *E Afr med J* 27, 445

30 Asirifi, Y (1957) Personal Communication Ghana

31 Benschine, F B & Brooklyn, M D (1941) Massive condylomata acuminata of the vulva, complicating labour *Amer J Obstet Gynec* 42, 338

32 ... na acuminata *Obstetrics & Gynæcology*, 10, 611

... s of 669 Cæsarean sections in Bombay *J Obstet*

... section. *E Afr med J* 27, 425

... ation—Anæsthesia for Cæsarean Section Ghana

... Cæsarean section morbidity and mortality at the

... *med Ass* 29, 6

... of 56 *Akush Ginek (U S S.R)*, 3, 104

vulva are in some cases torn The latter site is involved most frequently in patients who have been submitted to female circumcision in adolescence in the tropics, in compliance with customary practice amongst some nations Perineal blood loss following timed episiotomy accounts for a loss of up to 8 oz in some cases This amount is an important determining factor in the production of shock. Episiotomy should thus be undertaken only in cases where there is a definite indication for its use, and not as a routine procedure This is particularly the case in the tropics where the average hæmoglobin level in pregnant women is relatively low Whereas post-partum hæmorrhage is frequently associated with inadequate uterine involution following childbirth, the blood loss occurs in some cases where involution is adequate Soft tissue laceration occurs most often where there is rapid delivery of a large child The uterine tone is good, but there is considerable tearing of the soft tissues due to inadequate time allowed for preliminary stretching prior to delivery

Physiological separation of the placenta is associated with the formation of a retroplacental hæmatoma This locally pooled blood lifts the centre of the placenta off the uterine wall with uniform elevation extending from the centre and at a rate proportional to the thickness of the placenta overlying it If the umbilical [illegible]

the placenta may be uneven The separation occurs more quickly at the thinner parts of the structure away from the position of the cord attachment In this way the hæmatoma is released prematurely at one part of the lateral edge before the main part of the placenta is separated The separation mechanism is therefore interfered with Injudicious traction on the umbilical cord should never be employed as a method of encouraging it to separate If this is done it is likely to cause post-partum hæmorrhage by separating the segment above the attachment of the placenta, thus releasing the retroplacental hæmatoma

Post-partum hæmorrhage is more likely to occur in women who are nervous and whose co-operation in childbirth is poor than in women who accept the experience more passively and with resignation The use of deep anæsthesia for childbirth predisposes to post-partum hæmorrhage also, by interfering with the tonicity of the uterus Anæsthesia should therefore not be employed till the birth of the child is imminent, when a limited amount of analgesia may be used to alleviate the pain of the final perineal stretching Prolonged labour is frequently associated with a degree of post-partum atony of the uterus All measures calculated to ensure the easiest possible labour and minimise the chances of difficult or obstructed labour help to reduce post-partum hæmorrhage

The duration of labour has been considerably reduced in clinics where psychoprophylaxis is employed This technique is a form of preliminary training calculated to assist the mothers in mental and physical adjustment in preparation for the process of labour Macafee [1] noted the marked diminution in the total duration of labour in primiparæ during the past sixteen years associated with the greater degree of enlightenment in the younger generation of women relative to the subject of childbirth

17

Complications of Childbirth

POST-PARTUM HÆMORRHAGE

HÆMORRHAGE in childbirth may occur any time after the onset of labour It is least common in the period before the infant is born, and if such occurs it is usually associated with lateral placenta prævia Post-partum hæmorrhage is much more common after the birth of the child All bleeding after the birth of the child is usually considered to be post-partum hæmorrhage This may be conveniently divided into third-stage bleeding, at a time when the placenta is not yet expelled and true post partum hæmorrhage which occurs after extrusion of the "afterbirth" For practical purposes all bleeding following the birth of the child can be classed as post-partum hæmorrhage The methods of dealing with these conditions are largely dependent on whether the placenta has already been expelled or not Complete removal of the placenta is essential in the control of most forms of post partum bleeding

As it is considered within normal physiological limits to have a limited blood loss in childbirth, it becomes necessary to decide what amount of blood can be considered to be within normal physiological limits To measure blood loss accurately in these circumstances is extremely difficult Any clinical assessment must be considered only a rough approximation The total loss of blood in childbirth should not exceed 20 oz (1 pint) This loss is exceeded in about 10 per cent of cases, and these patients must be considered to have sustained a post-partum hæmorrhage The average blood loss in childbirth is 10 oz, or ½ pint Some authorities give lower figures Patients sustaining a loss of blood in childbirth of 2 pints or more approximates 1 per cent Such a loss is a very serious post-partum hæmorrhage and requires active blood replacement by transfusion

The signs of post-partum hæmorrhage are

1 Visible evidence of blood loss
2 Clinical signs of hypovolæmic shock

Fast pulse, fall in blood pressure, sweating, coldness of the skin and attacks of vomiting suggest hypovolæmic shock A large quantity of blood may be lost although it is not visible There is in these cases massive blood clot formation within the uterus and the upper part of the vagina although little active bleeding is visible Signs of shock are marked The blood loss becomes very obvious if an attempt is made to express the placenta, after sufficient time has been allowed for its separation Massive clots are expelled as the uterus is depressed

Most cases of post-partum hæmorrhage are associated with blood loss from the placental site To a lesser degree the bleeding may occur from tears of the soft tissues The uterine cervix, the perineum, or the anterior commissure of the

blood loss that is so vital Rather than go from one extreme to the other, it is suggested that the intravenous use of ergot preparations should be reserved for patients where there is a known risk due to an initial low hæmoglobin level of 60 per cent or below It is advisable, therefore, in all cases to make a preliminary estimate of the patient's hæmoglobin percentage *during the early stage of labour*

In cases where there is a severe and sudden post-partum hæmorrhage after the placenta has been removed complete, *it should not be forgotten that the* hæmorrhage can usually be temporarily or permanently arrested in most cases very quickly if a bimanual pelvic examination is undertaken and the uterus is forcibly acutely flexed between the hands Such a manipulation is much more efficient than uterine plugging alone Acute flexion maintained for ten to fifteen minutes is usually sufficient to arrest the bleeding During this time arrangements can be made for a blood transfusion if blood is available It also permits adequate time for the ergot preparation given post partum to work on the atonic uterus It is essential to act quickly if there is active hæmorrhage present Radical measures such as laparotomy and ligature of the uterine artery and veins, or even hysterectomy, are exceptionally rarely called for These drastic procedures should be reserved for cases where blood loss continues after repeated blood transfusion Such a procedure may be justifiable in rare cases in women over the age of 40 years The methods of dealing with placental retention and control of post partum hæmorrhage dependent on it will be dealt with in the next section

RETAINED PLACENTA

The third stage of labour extends from the time of the birth of the child to the time of expulsion of the placenta In the absence of any obstetrical assistance at all, evacuation of the placenta occurs spontaneously at the average time of two hours In only 10 per cent of women who are unassisted in childbirth does the placenta become expelled within one hour Normal separation of the placenta from the uterus takes not more than ten minutes, even when unassisted by the action of oxytocic drugs, where all structures are healthy and normal It leaves the uterine cavity within a further five minutes Separation and expulsion may be more rapid in some instances External manual pressure should not be exerted on the fundus of the uterus through the abdominal wall, with a view to expelling the placenta, for twenty minutes after the baby is born The uterus continues to contract rhythmically after the birth of the child but the muscular action, being unopposed, is not painful to the mother Ten to fifteen minutes are necessary for the physiological changes required in preparation for expulsion of the placenta If there is no post-partum bleeding, and uterine involution is adequate, there is no indication to use manual pressure to expel the placenta for at least twenty minutes If patience is exercised and interference avoided, the placenta can usually be expressed without difficulty at the first attempt twenty minutes after the birth of the child If the placenta has not left the mother within half an hour it is desirable to catheterise the patient A full bladder is a potent cause of retained placenta, and this condition can easily be relieved The placenta should not be considered truly retained unless it remains unexpelled for one hour or more

Ch'en Wen-Chen [2] noted that when psychoprophylaxis was used as preliminary training for labour the post-partum blood loss was considerably reduced by comparison to a control series of patients. All measures calculated to reduce blood loss are most important, particularly in countries where anæmia of pregnancy is marked and where there is often difficulty in obtaining donor blood for transfusion. Antenatal measures instituted to improve the patient's general health and standard of nutrition are important factors in the reduction of the incidence of post-partum hæmorrhage.

It is noted particularly in the tropics that if patients have a low-grade anæmia in pregnancy they are liable to suffer from a slow but continuous blood loss following childbirth. This is in many instances not essentially due to local causes such as incomplete separation of the placenta or retention of segments of it or to deep lacerations of soft tissues. It is due in these cases to the condition of afibrinogenæmia. In this condition there is an abnormally low clotting rate in the blood. If the patient's blood is defective in clotting power it is necessary to supply the deficient entity either by a large blood transfusion or by the use of serum. Powdered serum was originally available for use in such conditions, but it is not now being prepared by the commercial firms. The use of a preparation, "Panenogen," supplied in 1 gm. ampoules, can be used by injection as suggested by Fuentes, Puertollana and Baens,[3] working in the Philippine Islands. This type of bleeding is a matter of considerable concern, as noted personally when visiting hospitals on a tour of country stations.

The mortality rate due to post-partum hæmorrhage is dependent on the stage at which patients are first seen and the methods of treatment adopted according to the facilities available. Apart from the prophylactic measures adopted to reduce the risk of post-partum hæmorrhage the methods of treatment are essentially the efficient conduct of all stages of labour so that there is no needless loss of blood from tearing of soft tissues. Blood lost inadvertently must be promptly replaced by blood transfusion. Suture of perineal or cervical tears is not usually undertaken till after the placenta is expelled, but in exceptional cases it is necessary to arrest the hæmorrhage from these sites soon after the injuries are sustained. Bleeding from these sites must not be overlooked.

Whereas the practice of giving uterine stimulants after the expulsion of the placenta only was the routine practice in the past as a method of choice, it is now noted that intravenous stimulants to encourage uterine involution can be given with advantage immediately after the birth of the child. The danger of interfering with the expulsion of the placenta has in the past been over-emphasised. Enverga-Santos, Gonzales and Villarosa-Ferrer [4] suggest the use of either intravenous ergotrate, ergonovine or methergin. One of these drugs was given intravenously at the time of delivery of the child. It is suggested that the injection should be timed so as to correspond to the time of delivery of the first shoulder. 0.5 mg. ergometrine is a suitable dose of a drug which is usually available. This method is also advocated by Adair and Davis [5] with excellent results. The important advantage of this technique is that the placenta is expelled within three minutes in most cases and the post-partum blood loss is reduced to about 5 oz.—that is, a quarter of the normal maximum. This is most important as it is a reduction of

the most effective method of getting over the difficulty of shortage of blood required for transfusions in tropical hospitals The most convenient method of collecting the placental blood is to tie the umbilical cord at two positions and section it between the ligatures in the usual way and then after the placenta has been expelled wash it and clean the cord and allow the blood to drain away into a sterile container after again *sectioning the cord to remove* the terminal part, so releasing the blood-vessels The placenta can be held in a suitable container of the "retort stand" type so that the placenta is held up, permitting of the best drainage possible into the sterile container The quantity of blood removable from a placenta varies from 150 to 300 c c —roughly from ¼ to ½ pint By the use of fœtal blood in this way sufficient blood can be obtained from a maternity unit to supply the needs of urgent cases By the consistent and careful collection of all fœtal blood in every case, from 1 to 3 pints can be made available weekly in most maternity hospitals *It is necessary to type the fœtal blood before use* It will be appreciated that the blood group of the fœtus and the mother are not necessarily of the same type The fœtus gets one of the blood group factors from the mother and the other from the father *Fœtal blood can be taken and put in the blood* bank and typed ready for use as required The blood of the fœtus circulating within the fœtus and the placenta belong to one closed system This system is separated from the mother's circulation by the chorionic membrane, the fœtal blood being oxygenated by oxygen passing across the chorionic membrane from the maternal blood to the fœtal blood The chorionic villi of the placenta interdigitate with the uterine blood sinuses of the mother but the blood elements of the mother do not enter the fœtal circulation If all the fœtal blood is put in a *small blood bank and typed it will usually be possible to supply a suitable blood* for transfusion of any mother who requires it

The method of injecting the umbilical vein with various salt solutions as a means of expediting placental expulsion is of value in some cases 10 oz of normal saline are injected In a high proportion of cases of retained placenta it is found that either the placenta itself or the uterus is pathological in some respect A uterine fibroid predisposes to placental retention An old Cæsarean section scar produces the same effect, making separation of the placenta difficult A syphilitic placenta is not infrequently slow in separation, it is often firmly adherent at some parts causing considerable difficulty in manual removal Placenta accreta, a well-known condition, is associated with placental infarction and subsequent fibrosis

Manual removal of the placenta should be initially considered if the placenta is not expelled within half an hour, but it is safe to leave it for at least one hour if no active post-partum bleeding occurs Bhagat [7] points out *the extreme importance of avoiding loss of time in manual removal* of the placenta if post-partum bleeding starts before the placenta comes out If the patient's general *condition is initially* good the condition will deteriorate rapidly, due to loss of blood, if active steps are not taken promptly to remove the placenta *without delay Removal of* the placenta stops the post-partum hæmorrhage in most cases *It is very important* to watch a patient carefully, particularly where the hæmoglobin is below 60 per cent at the onset of labour Such cases do not stand *loss of blood well For this* reason it is advised that the hæmoglobin level of all patients should be estimated and

If the placenta is retained more than one hour it is usually desirable to take active steps to remedy the condition There is a close correlation between retained placenta and post-partum hæmorrhage For this reason there is still considerable danger of severe bleeding till the placenta is removed The risk of post-partum hæmorrhage decreases after the placenta is expelled In addition to the risk of hæmorrhage associated with retained placenta there is the added hazard of sepsis developing Sepsis can usually be controlled adequately by the use of antibiotic drugs

In small stations, where donor blood is not easily available for blood transfusion, it is of extreme importance that every measure should be adopted to decrease the risk of post-partum hæmorrhage With a view to so doing the methods of conduct of the third stage of labour are particularly important The procedure of giving intravenous ergometrine (0 5 mg dose) at the time of the birth of the child greatly reduces the risk of post-partum hæmorrhage With this technique the blood loss is much smaller than where pressor drugs are withheld till after the placenta is expelled, as was the usual practice up to about 1950 If intravenous ergometrine is given at the time of the birth of the child the placenta is usually expelled within three minutes of its birth The blood loss is reduced to about one-quarter of the usual amount The risk of causing retention of the placenta by the early use of drugs of the ergot group before the placenta has left the uterus is much less serious than the risk of post-partum hæmorrhage It is therefore considered a justifiable and desirable procedure Great caution is necessary to avoid overlooking the early stages of post-partum hæmorrhage If drugs are not used to cause a rapid expulsion of the placenta, it is desirable to massage the fundus of the uterus gently fifteen minutes after the birth of the child or if the uterus does not show signs of adequate involution Pressure exerted on the fundus of the uterus in the downward and backward direction usually expresses the placenta without difficulty

In many animals the umbilical cord of the offspring is severed by the mother biting through it Following this there is a small amount of hæmorrhage from both of the severed ends of the cord, but this stops quickly More blood leaves the placental end than the part attached to the umbilicus With this in mind, it is interesting to note the recent tendency in obstetrics to tie off the umbilical end of the cord and then sever it without tying the placental end but allowing it to bleed, so permitting drainage in order to exsanguinate it It is now considered in some circles that by exsanguinating the placenta in this way the maternal retroplacental hæmatoma is facilitated and so formed more rapidly In this way separation of the placenta occurs more quickly and it is expelled rapidly This method is mentioned for two reasons first, because of its academic interest and close similarity to the method adopted in nature by the lower animals, and secondly, because of the important fact that the placental blood can be collected and used for transfusion Speranskaya,[6] working in Russia, has made use of fœtal placental blood for transfusion during the past twelve years In this period, 1,153,385 c c of fœtal blood have been collected This is sufficient for two single-litre transfusions a week. From the same quantity three transfusions of a pint each could be given weekly This technique is probably

and Lushbaugh,[9] however, *have recently shown that such cases of* unexpected collapse during or soon after manual removal of the placenta were due in most cases to anaphylactic shock caused by the entry of amniotic products into the maternal circulation, either fluid or debris, and particularly of meconium contained in the fluid On post-mortem examination of such cases particulate matter of amniotic origin was found in the maternal circulation Where *post-mortem* examination was not permitted amniotic emboli were recovered on aspiration of cardiac blood This condition of anaphylactic collapse associated with manual *removal of the placenta* is now termed Lushbaugh's syndrome, because of the accurate description of it given by this authority If the patient's chest is X-rayed in these cases soon after the collapse an appearance will be noted very comparable to that seen in cases of miliary tuberculosis of the lungs If the patient recovers, it can be noted that the unusual pulmonary appearances settle down after one or two weeks *Manual removal of the placenta should not be lightly undertaken in* any case irrespective of the patient's condition, as it is not devoid of danger The danger is vastly increased by loss of blood General anæsthesia is required for the procedure In clinics where low spinal anæsthesia is employed for delivery one of the advantages *claimed for it is that in the event of manual removal of the* placenta being necessary it can be undertaken without further general anæsthesia

In the rare cases of placenta accreta which cannot be removed manually the question arises as to what one should do to deal with the condition If undue *force is used the uterus may be perforated* *Placenta accreta is not* usually associated with post-partum hæmorrhage Hysterectomy is sometimes advised, but this is considered unjustifiable Kaltreider [10] suggests that in these cases the placenta may be left *in situ* without undue detriment to the patient The cord is cut short The placenta fibroses in a similar manner to that noted in cases of full-term intra-abdominal ectopic pregnancy where, the baby being removed, the placenta is left behind unless it shows a natural tendency to separate A case was reported where a pregnancy occurred in a patient in whom a placenta accreta had been *left behind in the uterus following an earlier pregnancy* Antibiotic drugs should be given to control possible sepsis if the placenta accreta is left in the uterus The possibility of the development of a chorionic carcinoma from the placental elements at a later date is a theoretical hazard

INVERSION OF THE UTERUS

Uterine inversion is a condition where the structure is turned inside out *The fundus prolapses through a hypotonic* cervix so that ultimately the endometrial surface of the uterus is visible through the vagina In most cases seen the degree of inversion is so extreme that the enlarged post-partum uterus hangs as a pendulous mass several inches beyond the margins *of the vulva* Various degrees of inversion are described depending on whether part or the whole of the uterus is reversed In some instances the upper part of the vagina is also involved in the reversal process This predisposes to greater protrusion of the main mass Inversion of the uterus is seldom seen in places where obstetrical services are *adequate and freely* available. In parts of the world where medical services are

blood-pressure taken at the onset of labour With these facts available a decision can more easily be reached as to the most suitable method of conduct of the third stage of labour

If manual removal of the placenta is anticipated one large dose of long-acting penicillin should be given immediately Not infrequently in the tropics the patient is brought to hospital, after the child has been born at home, and there is a retained placenta present In these patients the general condition is often very poor when they are first seen Much blood is lost at home in many cases, various methods of attempting removal of the placenta having been tried before the patient is transferred to hospital

It is most important to avoid active steps to remove a retained placenta manually if a patient is first seen in a very shocked condition In no circumstances should manual removal of the placenta be attempted in these cases before a blood transfusion is given, otherwise the patient will die in a high proportion of the cases during or soon after the removal of the placenta Gupta,[8] commenting on such cases where the woman has lost much blood and is in a very shocked condition, advises that the control of hæmorrhage should be initially attempted by the use of ergot preparations Blood transfusion should then be undertaken before any attempt at manual removal is considered Potential or developed sepsis is controlled by antibiotic drugs The placenta should be removed only after the blood-pressure has been rectified by blood replacement He found that in cases where the placenta was left untouched for up to forty-eight hours there was in many instances a spontaneous expulsion after this time It is much better to leave the placenta *in situ* for a day or two and save the patient's life, following preliminary preparation for operation, than to adopt prompt manual removal injudiciously when the patient is not in a fit condition to stand operation

In all cases where blood transfusion is given in the tropics at short notice without adequate steps being taken to exclude the possibility of syphilitic infection of the donor, it is advised that three doses of 1 million units of long-acting penicillin should be given—one daily for three days following the transfusion The first dose should be given before the transfusion is started This appears sufficient to prevent infection in the patient transfused It is also advisable to give a course of antimalarial treatment to the recipient Having personally undertaken manual removal of the placenta on many occasions, over several years, it was noted that one of the difficulties encountered in late cases is that the uterine cervix has often contracted tightly To give a deep anæsthetic in order to relax the uterine cervix, so permitting the entry of the hand into the uterus, is dangerous In spite of the fact that at the onset of an attempt to remove a retained placenta manually a patient's general condition may be good, with adequate blood-pressure and a hæmoglobin above 60 per cent, it is noted that in a fair proportion of cases the patient may show a sudden and alarming degree of shock during or soon after the intra-uterine manipulation The degree of shock is much more than that which might reasonably be expected from loss of blood, which may be quite small Personally, it was considered in many of these cases at the time that the cause of the condition was probably an air embolism produced as the result of dislodgement of blood clots from uterine sinuses during the manipulations Steiner

where labour is normal up to the time of birth of the child Where the uterus is much distended, the wall of the structure is thin and this predisposes to inversion The wall of the uterus in the lower segment is particularly thin in these cases and so makes it more likely to invert than where the muscle structure is robust and thick

Elderly multiparæ who are in poor nutritional condition suffering from anæmia and hypoproteinæmia usually have muscular structures in a very hypotonic state In the cases personally noted the general nutrition was poor

The particular clinical findings which characterise this condition of uterine inversion are that there is a very marked degree of shock present in most cases The severe shock develops within fifteen or twenty minutes of the accident It is not immediately apparent Due to evagination of the organ there is much obstruction of the blood-vessels Œdema of the mucous membrane develops very quickly The return flow of blood from the uterus is impeded by angulation of the blood-vessels This angulation effectively closes the vessels of lower pressure, namely, the veins Blood is still received at the higher pressure through the arteries and œdema is therefore very marked The exposed surface of endometrium oozes serum freely, causing a serious blood protein deficiency, helping to precipitate the shock The endometrium bleeds freely when handled The exposed endometrium predisposes to early and rapid sepsis

This short note on uterine inversion is included as many doctors in the tropics are called upon at some stage of their career to deal with the condition It is a serious condition in view of the marked associated shock, hæmorrhage and early development of sepsis

Treatment of uterine inversion is much influenced by the time factor If *the doctor is present at the time of the birth and an acute inversion occurs on* removal of the placenta, an immediate replacement is usually possible, if undertaken within five to ten minutes of its occurrence At this early stage the patient does not show obvious evidence of shock If the patient is seen for the first time after the shock has developed, it is most unwise to make any attempt to replace the uterus at once It is essential to treat the patient for shock initially by giving stimulants, warmth and a blood transfusion The uterus can with advantage be washed gently with saline and sterile towels applied Antibiotic drugs should be given early in anticipation of the development of sepsis Following transfusion, the shock is usually much reduced and it is then possible to undertake replacement under general anæsthesia

There is a uterine repositor made for the purpose of replacing an inverted uterus This piece of apparatus is not considered to be a good instrument to use

... the cervix rather

vical

aced

to its normal position General anæsthesia is required for any form of manipulative repositioning unless this is done immediately after it occurs and the cervix is still patulous, otherwise, only with an anæsthetic can the cervix be made to relax sufficiently to permit of reduction The cervix contracts down progressively after the inversion occurs O'Sullivan's method of replacing the uterus by hydrostatic pressure is most efficient if cases are seen and treated within twenty four hours, this period

limited, inversion is more commonly noted Wong,[11] working in China, notes the incidence recorded as varying from 1 in 133,068 deliveries to 1 in 6,500 deliveries

condition is much higher than any of these figures given Four cases have been dealt with personally when working in general hospitals with a small obstetrical unit only The condition is not a common one, but being of a serious nature, when it does occur, must be recognised promptly and treated effectively Failure to appreciate the severe shock which develops early in this condition predisposes to injudicious active manipulative measures at a time when they are much better avoided

The condition is seen most commonly in elderly multiparæ It seldom occurs in younger women Such might well be expected at a time late in the child bearing period, when there is less elasticity of the tissues and a greater degree of stretching of pelvic structures due to repeated pregnancies The essential cause of the condition is an unduly lax uterine cervix The accident of uterine inversion is most common following childbirth It occasionally occurs in non pregnant women Pedunculated submucous fibroids within the uterine cavity predispose to the condition A minor degree of inversion is sometimes noted in these cases where the fibroids are extruded such a case is illustrated in Fig 65 In this instance the fibroids were attached not very far up the uterine cavity, but they pulled down quite an extensive area of the lateral uterine wall into the external os When the pedicle was severed the pulled-down lateral uterine wall receded In a similar manner inversion occasionally follows traction on the umbilical cord attached to the placenta It is highly dangerous to exert traction on the cord as a means of withdrawing the placenta Inversion may occur if undue force is used in an attempt to withdraw the placenta during manual removal at a time before complete separation has been procured In the cases seen personally the history was given that the condition occurred spontaneously and was not precipitated by uterine manipulation The history was probably incorrect It is usually reported that the patient strained on feeling that the placenta was coming away, but on an attempt being made to lift away the placenta the nurse found that it was attached to a solid maternal structure, this was the reversed uterus There is no doubt that inversion of the uterus could not occur unless the uterine cervix was very lax Laxity of the uterine cervix is predisposed to by prolonged and difficult labour with a marked degree of pressure trauma in the lower segment Following trauma of this sort contraction of the bruised part is much less active in the lower uterine segment than in the upper part of the uterus A hard tonic fundus is easily pushed through the lower segment, in the relaxed state, if the patient makes forced voluntary straining movements with her abdominal muscles The condition is liable to occur in patients in the tropics who, by miscalculation or adversity, bear a child away from their ordinary place of residence and soon afterwards travel a distance by foot carrying a heavy head load Any form of pregnancy where there is marked distension of the uterus predisposes to inversion This is seen in some cases of hydramnios and multiple pregnancies Inversion is very rare indeed in cases

the lower part of the uterus, to divide the rolled-over rim of uterus corresponding to the site of inversion and constriction By so doing, a perforating wound was made in the lower uterine segment which permitted of withdrawal of the fundus from within The fundus was pulled up and so replaced back into the abdomen after this releasing of the constriction On returning the uterus to its normal position there remained an incision in the lower part of the uterine wall perforating it completely over a distance of about 1 in Fortunately very little bleeding occurred There was no difficulty in closing the uterine wound in two layers The case being reasonably clean at the time of operation the abdomen was not drained in either case Both patients had an easy convalescence and recovered quickly

Vaginal hysterectomy can usually be undertaken in these late cases without undue difficulty but such a procedure is not favoured by women in the tropics A hysterectomy is an unnecessary hardship to such people and should be avoided if at all possible

Van Beukering [13] reports a case where after manual replacement of an inverted uterus the patient recovered and two years later again became pregnant There was no difficulty encountered with the subsequent delivery and no complications were noted This is the usual experience

Balasundram,[14] discussing inversion of the uterus, notes the end result in untreated cases as being

1 Infection, pyæmia and death
2 The uterus may slough off (spontaneous hysterectomy)
3 Involution and persistence
4 Spontaneous correction after some hours or even years

The mortality rate due to inversion of the uterus is very high Probably most cases die from shock and hæmorrhage in remote villages In some cases sepsis is the terminal factor The most important thing to remember in dealing with these cases is that to undertake manipulative treatment in the presence of shock is contraindicated

BIRTH TRAUMA TO THE CHILD

[illegible] injury which [illegible] cases of [illegible] accident predisposes to defective development of the long bones It is a likely cause of children being born with a short leg on one side as illustrated in Fig 143 The femur and the humerus are the bones most frequently affected A physical defect which is relatively common and occurring as a result of insufficient amniotic fluid within the uterus during late pregnancy is club-foot Inadequate space within the uterus for the child to move about freely predisposes to the maintenance of a fixed position with continued pressure on the lateral aspects of the feet

Permanent physical defects directly related to the process of childbirth are most commonly seen in the form of various vascular accidents with resultant partial paralysis or spastic conditions The risk of intracranial hæmorrhage is increased by the deficiency of vitamin C in the diet of the mother late in pregnancy

allowing the patient to recover from shock Following a blood transfusion the patient is anæsthetised and placed in the lithotomy position After adequate cleaning and towelling the exposed surface of the uterus is washed with sterile normal saline The uterus is then elevated and by the use of the lithotomy position the uterus tends to recede back into the vagina The next stage of replacement is undertaken by the introduction of warm normal saline into the vagina from a large fluid container and rubber douche tube The height of the reservoir should be 3 ft above the patient in order to produce sufficient pressure to reduce the inversion The vagina being washed out and filled with fluid, the entrance to the vagina is closed tightly by pressing the left forearm firmly over the labia The weight of the column of fluid then exerts a hydrostatic pressure uniformly through the vagina and on the surface of the uterus The heat of the douche probably helps to relax the cervix Reduction occurs using this method after fifteen to thirty minutes In this way uniform pressure is directed from above downwards in a manner which inflicts the minimum of trauma on the local structures The last part of the uterus to pass through the cervix is the fundus When reduction appears to be complete the fingers can then be inserted into the uterus to ensure that reduction is adequate and satisfactory A gauze pack is then put into the vagina and the patient returned to bed The foot of the bed can be raised with advantage for eight hours following operation Postural reduction of any prolapsed pelvic structure is a most effective method of replacement The rate of reduction should not be hastened by any manipulation applied directly to the uterus unless absolutely unavoidable Manual assistance should be given only in so far as it is necessary to elevate the uterus initially It is also required to prevent the escape of fluid from the vagina

Where patients are seen for the first time several days or weeks after inversion has occurred, it is seldom possible to replace the uterus from below Shock having passed off and uterine tone regained, the cervix contracts down to a small size—this precludes reduction If the patient does not succumb as a result of the hæmorrhage, shock or sepsis caused by her condition, a chronic inversion results Two of the cases dealt with were of this type—they were both sent from distant stations for treatment about one week after the initial accident The patient's condition was good in each case at the time of being transferred to the surgical clinic Sepsis had been controlled by penicillin It seemed that in such cases the most satisfactory procedure was to undertake a laparotomy and perform a Haultain's operation Both cases were precisely similar On opening the abdomen it was noted that whereas the uterus was protruding a considerable distance from the vulva the actual position of the reversal was at the level of the lower uterine segment this corresponded to about 1 in above the external os The vagina did not appear to have been pulled down at all and there was considerable pelvic congestion present The Fallopian tubes could be seen from above entering into the cavity produced by the evagination of the uterus They entered a pit-like cavity, one at each side The tubes were attached at the bottom of this cavity, corresponding to the lateral horn position but reversed The essential constriction preventing reduction from below corresponded to a position close to the internal os It was not difficult in either of these cases, after isolating the bladder from

skin about the ankles is not injured by the application of strapping. If in a breech delivery the after-coming head is unduly large the force necessary to extract it is sometimes sufficient to cause damage to the upper trunk of the brachial plexus. This gives rise to an Erb-Duchenne type of paralysis of the arm. The nerve injury is one in the nature of a "rupture in continuity". The nerve trunk is pulled and so fibres are ruptured by traction but the nerve is *not completely torn* across. The fibres regenerate and recovery takes place to a large extent, but usually not completely. Recovery is gradual and often takes up to one year. If residual paresis remains after this time there will be some permanent disability. The only further functional improvement which can be expected is that due to muscular redeployment, as in cases of limb paresis following poliomyelitis.

Some cases of fœtal loss are due to failure in initiation of respiration. This is due, in some instances, to the anoxic effect on the brain stem produced by prolonged labour. The usual methods of activating the child are stimulants such as coramine by injection, brandy put into the mouth, partial immersion in alternating warm and cold baths, gentle slapping on the legs and rocking in the manner used for artificial respiration. Poluschev,[15] writing on this condition, advocates the use of 3 c.c. of sterile 10 per cent. calcium chloride injected into the umbilical artery. He found that this was a most effective method of stimulating respiration; it was successful in 95 per cent. of the cases. Breathing started almost immediately after the injection was given. A supply of sterile ampoules of 10 per cent. calcium chloride should be kept in the labour ward so that it is readily available for use in emergency.

In cases where the child dies as a result of pressure trauma of obstructed labour, it is necessary on occasions to perform mutilating operative procedures on the child in order to facilitate delivery of the mother. Great care must be taken to avoid damaging the mother by instruments used of necessity by the guidance of touch rather than under direct vision in some cases.

POST-PARTUM VAGINAL FISTULÆ

Post-partum fistulæ result from pressure necrosis at various sites in the lower

exceptionally rare to encounter a fistula if the labour is less than thirty-six hours. With the breakdown of local tissue a communication is produced between the vagina and the bladder in front or the vagina and rectum behind. On rare occasions a communication develops between the lower part of the ureter on either side and the corresponding lateral fornix of the vagina. The various forms of fistulæ may exist singly or in combination with each other. Post-partum vaginal fistulæ constitute a major surgical problem in all countries where obstetrical services are inadequate or where the value of these facilities is not fully appreciated by the local people. These genital fistulæ are now rare in the main cities of Europe; they still occur in small numbers in the less highly developed rural areas. Most

If this occurs, the infant frequently has a marked tendency to neonatal hæmorrhages Bleeding from the umbilical cord stump and cephalhæmatoma are most often seen An adequate supply of vitamin C in the diet in late pregnancy decreases these risks

During normal childbirth there is a small amount of overlapping of fœtal skull bones which decreases the biparietal diameter of the baby's head to the extent of from 1 7 to 2 mm Minor overlapping is not associated with vascular accidents In cases of difficult and obstructed labour and where forceps are used, overlapping of skull bones may be extreme—3 mm Rupture of cerebral sinuses may result The high fœtal loss associated with forceps delivery is in almost all cases accounted for by intracranial hæmorrhage The vertex or the base of the brain may be affected In some instances the brain stem is adversely affected If an infant survives an intracranial hæmorrhage at childbirth there frequently remains a hemiplegia or a varying degree of spasticity Behaviour abnormalities may also be accounted for by birth injuries In some instances intracranial hæmorrhage, initially not apparent when of lesser degree, gives rise to cortical adhesions, and these subsequently manifest themselves by epileptic fits In many respects epilepsy is a more serious condition than a monoplegia A child developing epilepsy is at a grave disadvantage socially and economically Many schools are unwilling to accept epileptic children as being a constant source of worry and inconvenience Employers decline their services, fearing repeated absenteeism or industrial accidents which involve a liability By reason of limited education and a poor chance of permanent employment, their ultimate wage-earning capacity remains at a low level In Sweden and Germany epileptic patients were forbidden to marry Associated with epilepsy there is, in a high proportion of cases, a serious mental deterioration with advancing age The seriousness of physical defects, inflicted upon a child as a result of difficult labour, increases the responsibility of the medical attendant The conduct of labour is a most serious undertaking

Forceful extraction of a child with obstetrical forceps is a potent cause of fœtal loss Any measure which decreases the necessity for application of obstetrical forceps will lower the rate of neonatal intracranial hæmorrhage with its subsequent sequelæ The judicious use of symphysiotomy in cases of midpelvic and outlet obstruction and the use of the vacuum extractor of Malmstrom to replace metal forceps delivery are both measures which should be given serious consideration

In cases of breech extraction of the infant, fracture of the clavicle, the humerus or the femur occasionally occurs These are rare accidents but caution must be exercised to avoid them Fractures of the clavicle and the humerus can both be treated by strapping the child's arm to the side of the chest and front of the abdomen for three weeks Over this a wide crepe bandage is used right round the body the results are invariably good These fractures heal within three weeks with little if any final disability If the femur is fractured it is less easily recogn[illegible]

[illegible]

using strapping, the body resting on the bed in the dorsal position, and a transverse beam for fixation supplied by a gallows or Briant's frame The bone unites within three weeks in infants Care must be exercised to see that tender

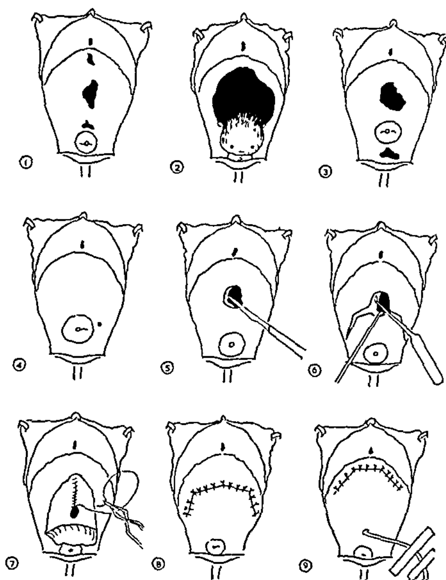


Fig 158

(1) Vesicovaginal fistulæ—para urethral, midvaginal, and juxtacervical
(2) Fistula, large size, with prolapse of urinary bladder, showing ureteric orifices
(3) Combination of fistulæ, vesicovaginal and rectovaginal
(4) Ureterovaginal fistula in lateral fornix of vagina
(5) *Midvaginal fistula showing separation of layers in the edge*
(6) Separation of bladder from vaginal skin after release incisions opened
(7) Closure of fistula, first line of continuous 000 chromic catgut suture
(8) Vesicovaginal fistula repair complete Drainage by urethral catheter
(9) *Urethrovaginal fistula closed, counter drain in position per vaginal cystotomy*

vesicovaginal fistulæ seen in Europe and North America are those found secondary to surgical trauma, following total hysterectomy operations

Almost all the large series of cases of post-partum vaginal fistulæ have been recorded from tropical areas of the world

1 Mahfouz,[16] Egypt, operated on 400 cases up to the end of 1938
2 Bowesman,[17] Ghana, reported 150 cases, writing in 1955
3 Preston,[18] Kenya, recorded 100 cases, using ureteric transplantation in 1951
4 Rendle-S... -56)
5 Hayes,[20]
6 Louw,[21]
7 Abbott,[22] East Africa, presented 40 cases in 1950

No doubt all these numbers could be greatly increased if records to date were available The name of Marion Sims is associated with the early development of technique in the treatment of this condition in 1852 After repeated early failures he ultimately achieved considerable skill and success and established the operation on a sound scientific basis

On first arrival in the tropics few patients with this condition may be seen, but if one case is operated upon with success many further patients soon come to hospital with the same condition This malady is undoubtedly very much more common than is generally believed A very high percentage (95 per cent) of vaginal fistulæ seen in the tropics are due to difficult and obstructed labour, the remaining 5 per cent are accounted for by malignant disease, lymphogranuloma inguinale and accidental trauma and other rare causes Moir,[23] reporting 100 cases of vaginal fistulæ from England in 1954, noted that 36 per cent were obstetrical in origin while 64 per cent were of gynæcological origin and not associated with childbirth

Following the relief of difficult labour there is seldom immediate evidence of leakage of urine or fæces After two, three or four days, however, urinary incontinence develops There may also be a loss of fæces Leakage starts as soon as the areas of pressure necrosis break down The fistula is often initially of very large size, but becomes much smaller during the subsequent three months The early appearances frequently suggest that operative repair of the fistula would be quite impossible, but with rest, tonics, vitamins, antibiotic drugs and high protein diet great improvement takes place The separation of sloughs takes up to four weeks after this time the fistula becomes much reduced in size Ultimately the loss of tissue would appear to be only about one-quarter of the original extent noted It is, therefore, necessary to exercise caution and consideration before pronouncing a poor prognosis Some apparently quite irreparable cases are found in time to be not unduly difficult to close It is necessary after making an initial clinical diagnosis of the condition to make an adequate and thorough examination in the theatre under more favourable conditions Good light and appropriate retractors are required to see the exact size, disposition and nature of the fistula or fistulæ present Various combinations of fistulæ may exist There are sometimes two fistulæ between the bladder and the vagina Fig 158 illustrates the various dispositions of vaginal fistulæ and the steps taken in local repair of these

phosphatic deposit on the sparse pubic hair or attached to tags of *vaginal skin* These patients try to keep themselves dry for the first few months after the fistula is formed, but soon find this is impossible and give up the effort in despair They therefore arrive at hospital in a very distressed state, wet and smelling offensively of decomposing urine When they are cured by operation they are invariably most grateful patients

It is the common experience that most cases of *post-partum* vaginal fistulæ are noted in young women The condition often follows the first pregnancy



FIG 159
Mid vesicovaginal fistula of small size Photograph taken at four months post partum

In some instances they are found in women who have several children alive, no previous obstetrical difficulties having been encountered There are two principal reasons for the frequency of these fistulæ in the younger age group of women First, in primiparæ, labour is normally more prolonged than in multiparæ Secondly, few post-partum vaginal fistulæ occur in women unless they have been in labour for over thirty-six hours The history is almost invariably given by the patient that she was in labour for two days Whereas women under the age of 30 may be in labour for up to two days without rupturing the uterus, women in the second half of the child-bearing period are very liable to rupture the uterus if labour exceeds thirty hours Prolonged labour in multiparæ therefore ends with a rupture of the uterus and death much more often, and so fistulæ do not come to

conditions A strong sedative is given before the examination in the theatre, but an anæsthetic is seldom required

Vesicovaginal fistulæ are conveniently divided into three types—para urethral, midvaginal and juxtacervical, depending on their situation They are divided in this way as the method of treatment is determined to a considerable extent by the area involved The midvaginal type is usually easiest to close Those involving either the urethra or the tissues close to the uterine cervix are much more difficult to deal with It is mentioned that where a small midvaginal fistula (Fig 159) is present, of only 2 or 3 mm in diameter, it is sometimes very difficult to close, contrary to expectation It is advisable in such cases to cystoscope the patient after obstructing the fistula on the vaginal side by gauze packing In these cases it has been found personally that if success is not achieved in local repair of a small fistula the reason usually is that one of the ureters enters into the lateral edge of the fistula making satisfactory closure difficult For this reason preliminary cystoscopy is advised If only one ureteric orifice can be visualised it can be taken with fair certainty that the other is embedded in the edge of the fistula Special care must be exercised in these cases so that in closing the mucous membrane of the bladder and the muscle layer the lower end of the ureter is not inadvertently obstructed by the suture lines Whereas the site of vesicovaginal fistulæ and rectovaginal fistulæ are usually easily detected, it is often quite difficult to detect a ureterovaginal fistula The opening of a ureterovaginal fistula is generally of pin hole size if present, it will be found almost invariably about 2 cm lateral to the uterine cervix in the lateral fornix of the vagina On occasions it is difficult to find Only by drying the area carefully and watching this position under good illumination and adequate retraction is a small trickle of urine detected after half to one minute Ureterovaginal fistulæ account for 2 per cent of all vaginal post partum fistulæ The sign, which is very typical of ureterovaginal fistula, is that following successful repair of a vesicovaginal fistula the patient passes urine normally through the urethra at regular intervals, and in apparently normal volume at each voiding, but in addition to this she continually leaks a small amount of urine down the vagina This is due to the fact that the bladder is filled by the undamaged, and perhaps partly by the damaged ureter, but from the damaged ureter a small quantity of urine leaks into the vagina in addition Patients usually leave hospital saying that they are quite well and dry, passing urine freely from the bladder per urethra The small amount of dampness does not worry them unduly at first as they feel that it will soon stop they admit two or three months later that they were never completely dry The most satisfactory method of treatment of ureterovaginal fistula is to approach the lower end of the implicated ureter through the abdomen and, after tying off the lower end, excise the damaged area and reimplant the ureter into the bladder about 1 in higher up the lateral wall of the bladder The operation is undertaken in a manner very similar to that used for transplantation of the ureter into the sigmoid colon A mucous membrane to mucous membrane junction should be used

With large midvaginal fistula the bladder frequently prolapses into the vagina, in part or completely (Fig 160) There is with all vesicovaginal fistulæ marked ammoniacal dermatitis of the vulva In very neglected cases there is frequently

Details of the technique are necessarily brief. There are many points which might be discussed with advantage. Having personally operated upon a large number of these cases many points come to mind, but for those particularly interested in this condition the articles mentioned in the bibliography will be found helpful.

A patient can be considered cured of a post-partum vaginal fistula only if, following operation, normal physiological control of micturition is regained. Cases treated by transplantation of the ureters into the sigmoid colon, or the cæcum, can be classed only as "improved". The subsequent method of evacuation of urine is not normal. Patients are frequently referred to the surgical department for treatment of post-partum vaginal fistulæ a few days after delivery. At this stage it is quite unsuitable to undertake an operation for relief of the condition. The patient should, however, be examined and informed of the likelihood of cure of the condition after adequate rest and preparation. Even at the early stage it is a benefit to the patient to be given assurance and encouragement. This enlists co-operation on both sides. The optimum time for dealing with a case of vesicovaginal fistula by operation is three to four months after the difficult labour which caused it. Initial treatment should be directed towards improvement in general health and control of infection. As infection about the genito urinary tract is associated with a high coliform bacterial content, streptomycin and chloromycetin are very suitable antibiotic drugs to use for this. When tetracycline drugs are used the courses should not exceed one week, as they are otherwise likely to be dangerous and predispose to a serious enteritis due to organisms of *Bacillus pyocyaneus* type, as noted by Gamble and Harris[24]. Mixed vitamins should also be given.

The use of vesicovaginal bags for the collection of urine may be employed as a temporary measure to make the patient more comfortable, but these are not well accepted by patients in the tropics. They are unsuitable as a permanent method of dealing with these cases. The rubber deteriorates rapidly and the bag cannot easily be replaced.

Repair operations for vesicovaginal fistulæ may be by the suprapubic route or by a direct vaginal approach. When the suprapubic approach is used the operation may be undertaken as a transperitoneal procedure—von Dittel's[25] operation. This method is also recommended by Legueu[26]. Trendelenburg[27] used the intraperitoneal transvesical route. Both Williams[28] and Aleksandrov[29] favour the extraperitoneal transvesical route and consider it most satisfactory. In some cases of juxtacervical fistula a transperitoneal approach may be used with advantage and found more satisfactory than a direct vaginal approach. When a fistula is placed in a very high vaginal position and is associated with much scar tissue formation, it is very difficult to deal with by the local approach from below. If there is very little scar tissue present, it is not necessarily very difficult to deal with by the lower route. In high vaginal fistulæ cases a transperitoneal suprapubic approach may be used with advantage and found more satisfactory than a vaginal approach. The position of the uterovesical pouch is entered at the back of the bladder and the bladder separated from the vagina. A repair of the bladder defect is then made. The repaired area is then rotated away from the opening in the vaginal

light in these cases where they well might have been seen if the patient had lived

Post partum vaginal fistulæ may occur in patients who are relieved by forceps delivery or Cæsarean section after very long labour. The incidence of vesicovaginal fistula seems to vary greatly following forceps delivery by different doctors. This is probably due to the criteria which are used in judging the time and method of relief of difficult and obstructed labour. It undoubtedly helps greatly in reducing

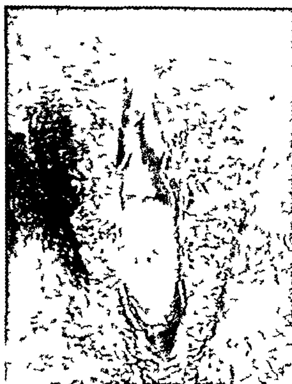


FIG. 160

Large mid-vaginal fistula showing prolapse of bladder through fistula

the incidence of post partum fistulæ if following the relief of obstructed labour by whatever means judged best a urethral catheter is put into the bladder and retained for three days following the operative assistance. This should be done if it is noted on withdrawing urine after delivery that there is blood in the urine. Catheter drainage for three days prevents a rise in intravesical pressure and prevents fistula formation in some cases where the damage is small. If damage is extensive and fistula formation is inevitable, the fistula will probably be of a much smaller size than might otherwise have been the case had catheter drainage not been used. If the size of the fistula can be reduced by this method a great advantage is gained and the smaller fistula formed will be easier to close than if the fistula is very large.

TENSION ON THE STITCHES This is difficult if there is extensive scar tissue present locally The scar tissue in the vagina in some of these cases assumes a consistency like fibrocartilage, and closure without tension in these cases is wellnigh impossible There are several methods suggested for getting over the difficulty of obstruction by scar tissue if it is not too hard in consistency A release incision may be made at one or both sides of the fistula, as when operating on cases of cleft palate

Schuchardt's [30] lateral release incision is excellent in cases where much scar tissue is present—an incision so extensive is seldom necessary The Schuchardt incision extends from the side of the fistula through the vaginal skin * in a broad sweeping manner down the lateral vaginal wall and crossing the perineum edge in the manner of an episiotomy and finally ending up by curving in to the centre of the perineum in front of the anus By lateral release incisions, to whatever extent is necessary, the bladder can be separated extensively from the vaginal skin and so more easily sutured without tension being exerted on the tissues approximated In order to get adequate release of tissue about the site of the fistula it has been found suitable in most cases to make an incision on each side of the fistula from its edge for about 1 in laterally (Fig 158) Once the edges of the fistula have been excised they are split and the mucous membrane of the bladder and the muscle coat are pushed away from the vaginal skin The mucous membrane and muscle layers are kept as one sheet of tissue, although they are subsequently sutured in two layers The mucous membrane alone is first sutured and then the muscle layer over this On separating the mucous membrane and muscle layer from the vaginal skin it will be found that there is a good plane of cleavage between these layers, and after the fibrotic area immediately round the fistula has been divided the lateral parts separate much more easily Opening of this layer can be facilitated by the injection of 10 c c of water with adrenaline added into the space deep to the vaginal skin This also decreases bleeding A Negus tonsil dissection knife is used for the separation of the layers Once the more lateral position is entered the index finger covered with a gauze swab can be pushed into the gap and the bladder separated extensively from its lateral and anterior surroundings in the retropubic position

In the Sabadini and Ducassou [31] operation almost the complete bladder is isolated other than at its base where the blood supply enters These workers advocate a combined approach both vaginal and suprapubic extraperitoneal to ensure adequate freeing of the bladder before suture of the bladder in cases where the fistula is very large The idea is excellent and the principle sound, but it is not absolutely essential to make the additional suprapubic opening to get adequate freeing When the bladder is well freed anteriorly and laterally the whole bladder can be pulled out from the vulva for a considerable distance and sutured accurately without tension It is then released and returns to the pelvis

Abbott [29] comments on the advantage of the Schuchardt release incision It may be a particular advantage in cases where, following infibulation, there is much scar tissue present in the lower third of the vagina Fortunately the perineal tissues have very little tendency to form keloid scars even in heavily pigmented patients Healing is rapid and the subsequent perineal scar is of the flat type Many

* The term "vaginal skin" is considered more accurate than "vaginal mucosa

wall so that an undamaged part of the bladder covers the vaginal defect. The vaginal skin cannot usually be closed but this heals once the bladder is satisfactorily closed. A similar approach must be used for cases of vesicocervical fistula where the communication is between the bladder and the uterine cervical canal. In these cases the urine leaks from the bladder and comes out through the uterine cervix. This is a rare type of fistula. It is not a difficult fistula to close and is usually of small size.

Having personally undertaken all the types of operation suggested for post partum vaginal fistula, it is considered that the direct vaginal approach is much the most suitable in cases of urethrovaginal fistulæ and midvaginal types, but where the fistula is placed very high up, and particularly if it is associated with much scar tissue formation, the transperitoneal retrovesical operation is most satisfactory. The transvesical approach is, however, considered not nearly so satisfactory as other methods for any type of fistula. Each operator has his personal preference. It has the great additional disadvantage in pigmented female patients that it is very liable to be followed by a troublesome suprapubic keloid scar. The tendency is to adopt the local approach more and more as experience is gained. Mahfouz[16] used the local approach almost exclusively, particularly in his later cases. When a transperitoneal suprapubic approach is used the patient lies flat on the operation table with a slight Trendelenburg tilt; this facilitates displacement of the small bowel from the pelvis.

In undertaking local repairs per vaginam the patient is placed in the Trendelenburg lithotomy position. The ventral jack knife position is sometimes used. Using this position the separated legs hang down over the end of the table while the patient lies on the abdomen in the ventral position. The head and shoulders are much lower than the buttocks; the buttocks are then the highest part of the body. The left lateral position was first introduced by Simms for the repair of vaginal fistulæ but is now seldom employed.

Most workers adopt the position they have seen used by their teachers and they continue to use the one they get most used to. The Trendelenburg lithotomy position has been used personally most often. This position has the advantage that when some bleeding occurs the blood runs away from the field of operation easily. Bleeding is seldom severe in these operations. If the jack knife position is used it is noted that there is remarkably little bleeding, the reason being probably that much of the blood of the body is ' pooled ' in the legs, which are placed in the dependent position. The little bleeding there is, however, remains at the site of the operation which is then lowermost in the vagina. Swabbing is therefore more frequently needed. A suction apparatus left in position is a great advantage. One of the greatest inconveniences of the ventral position is that the legs tend to get in the way of the operator and for this reason if no other the Trendelenburg lithotomy position is favoured.

It is essential in closing fistulæ in any part of the body to close the defect in three layers. Each layer should be closed separately—internal, intermediate and external. If in dealing with a mid vesicovaginal fistula the edges of the fistula are simply split and closed in two layers, as suggested in some textbooks, success will seldom be achieved. It is essential to close a fistula in three layers and WITHOUT

the light exactly where it is needed and where it is very difficult to illuminate A Halstead's needle holder, which has a double-jointed and angled action, is convenient as vision is not obstructed by the hand when it is employed One Michel clip used to hold each of the lesser labia in a laterally retracted position is a great advantage in improving the field of vision Because of the confined space of the operative field it is essential to use very small curved needles Cleft palate needles greatly facilitate the suturing With small needles there is usually a very small eye, and they are therefore difficult to thread *Much time can be wasted* threading needles and it is recommended that cleft palate needles of the eyeless type, with fixed ligature material attached, should be available and kept in readiness The ligature materials which are considered most suitable for repair are

1 For closure of the bladder mucous membrane, 000 chromic catgut
2 For closure of the muscle layer, 00 chromic catgut
3 For the vaginal skin, fine monofilament nylon

Closure of the bladder mucous membrane should be by a continuous suture This makes a watertight joint and is very much more likely to give a successful result than if interrupted stitches are used The musculo areolar layer is also closed with a continuous suture A running type of Lembert suture is suitable for the muscle layer After the muscle layer is closed three or four additional interrupted chromic gut sutures may be put in to prevent tension of the primary sutures *The vaginal skin should be closed by some form of insoluble material*, which is subsequently removed after one week to ten days Fine calibre nylon has been used most often in my cases Uebermuth [33] recommended the use of Michel clips for closure of the vaginal skin These have been used with success on several occasions personally, but it is found that they are sometimes rather difficult to apply as it is not easy to hold the edges with everting forceps of the Child s type when applying them—otherwise they are satisfactory In a similar manner some operators like silver wire sutures, *but again silver wire is not easy to use even though it is* efficient There appears to be no advantage in using silver wire as opposed to monofilament nylon, which is much easier to work with Thread is a most unsuitable material to use in any layer of the repair Fig 21 shows thread sutures removed from a patient operated on for vesicovaginal fistula who was transferred from a distant hospital because of failure to achieve closure of the fistula Thread ligatures become encrusted very rapidly with phosphatic deposits

Following repair of vesicovaginal fistula, water should be put into the bladder (100 c c) to see if the water introduced leaks through the suture lines or not The suture line should be watertight This testing has usually been undertaken after the completion of the operation, but an excellent point has been made by Randle-Short [19] working in Uganda, who recommends that the testing should be

up the wound a second time after final closure causes [illegible] in the vaginal skin, and this is detrimental to satisfactory healing Following a repair operation the vagina is packed for twenty-four hours to prevent hæmatoma

vesicovaginal fistulæ, looking initially quite small, look very much larger after preliminary excision of their edge Some workers stress the importance of not removing the actual rim of the fistula so that the immediately underlying scar tissue continues to maintain the small size of the fistula By not releasing this scar like ring the fistula to be closed remains small and so a lesser vent has to be closed than if the ring is excised Personally, excision of this edge has been adopted, realising that healthier tissue is then available for apposition with the mucous membrane continuous stitch

Local repair of vesicovaginal fistula is a tedious operation and takes about one hour and a half to perform in most cases It is, however, gratifying to be able to give the patient relief from a very distressing condition

Spinal anæsthesia is very suitable for fistula operations in this position and has been used as a routine An exception is made in cases where there is evidence of limb weakness due to post-partum pressure neuritis following delivery, in which cases general anæsthesia is used Light nupercaine has been found satisfactory it gives an anæsthesia lasting up to about two hours Some consider light nupercaine a dangerous anæsthetic, but if properly used it is excellent It is essential to maintain a slight Trendelenburg position throughout the operation when light spinal anæsthesia is used Ephedrine (½ gr) is given before the spinal anæsthetic is administered This helps to counteract a possible slight fall in blood pressure The dose of light nupercaine used is 10 c c only, this amount is very safe and all that is necessary, as the women are in most cases of short stature—average about 5 ft If the dose of ephedrine exceeds ½ gr it is liable to make the patient vomit, due to the ephedrine itself

Local repair operations for vesicovaginal fistulæ are greatly facilitated by the use of suitable instruments It will be appreciated that the operative field has several features very comparable to the buccal cavity and therefore some of the instruments used in tonsil operations are eminently suitable for use in cases of vaginal fistulæ A suction apparatus is most helpful and prevents the necessity for a lot of swabbing The Negus pattern angled tonsil dissection knife is most useful in separating the bladder from the vaginal skin after splitting of the edges of the fistula The edge splitting is best started with a No 11 blade Bard-Parker knife It is essential to have adequate lighting available in order to see accurately [illegible]

it can be inconvenient if it requires repeated refocusing If a head-light band does not fit comfortably it is liable to predispose to a severe headache Mossop[32] makes a very good suggestion regarding illumination for this operation, he recommends the use of an electric laryngoscope as a retractor This is of particular value in remote country stations, as the instrument is worked by batteries in the handle The McIntosh type of endoscope, with a slightly curved blade, is suggested for use Another instrument which is very helpful in visualising the exact limits of the fistula is a dental mirror This is most useful in cases where there is difficulty in seeing the disposition of the tissues because the fistula implicates the urethra at the back of the pubis This gives an excellent reversed image and also reflects

normal angulation of the urethra which is so important in the mechanism of female urinary control This slight complication clears up after three or four days

Following local repair operation for fistulæ, bladder washouts with 1 per cent eusol have been employed, but this is not essential it may even predispose to the introduction of sepsis unless great care is exercised to avoid it It is probably better to encourage the patient to drink plenty of water A course of sulpha drugs is given in all cases after the urethral drainage is finally removed The practice of keeping the patient in bed for two weeks following operation has been followed Early ambulation is considered inadvisable in these cases The patients are nursed in whatever position they are most comfortable It is no advantage to keep them in the ventral position following operation to maintain this position is very uncomfortable

In some cases of urethrovaginal fistulæ, repair operations are very difficult There is sometimes only a residual ¼ in of urethra remaining which is closed completely at its inner end The bladder is completely separated from the urethra To repair these cases successfully the urethra must be opened and the inner end isolated, after this the bladder is isolated locally and the remains of the urethra approximated to the fistula in the bladder Suturing is difficult and tedious, necessitating great care and patience The Sabadini and Ducassou operation is suitable in these cases However, it is usually possible to isolate the bladder sufficiently from below and so avoid the additional suprapubic opening, which they recommend as a combined procedure The bladder must be extensively released at the back of the pubes to permit of bringing it down sufficiently to approximate it to the remains of the urethra without tension In one case where this was not possible the bladder was closed completely and after closure a trocar and cannula was put through the remains of the urethra and pushed into the bladder in a new site A urethral catheter was then inserted and the tissues approximated over the area as well as possible Fortunately the patient healed up satisfactorily and the fistula closed It was then found on removal of the urethral catheter two weeks later that the patient was unable to pass any urine at all The catheter was therefore reinserted On removing it a second time, two days later, the same thing happened The patient was completely obstructed by a valve like tongue of bladder tissue It was thus decided to decrease the degree of angulation by removing this tongue like piece of tissue This was undertaken using a transurethral prostatic resector Fortunately the desired effect was achieved without further damaging the urethral repair The patient left hospital passing urine normally

It was not appreciated during the earlier years that following repair of urethrovaginal fistulæ the patients are very liable to develop a urethral stricture at the site of repair one to two years later In latter years some cases have been seen in which this happened where operation had been undertaken several years earlier For this reason it is now recommended that in all cases where the urethra is involved the patient should be instructed to report twice a year for examination and passage of urethral sounds to see if there is evidence of stricture formation at the site of the repair This is important One patient who developed a urethral stricture following a urethrovaginal repair subsequently formed a bladder stone and, with the developing stricture causing marked obstruction, the old fistula broke down

formation between the layers of the wound The latter, however, is not a common complication.

If the urethra is not involved in the fistula the bladder can be drained through the urethra by catheter—size 6 or 8 is suitable The catheter can be removed daily, washed, sterilised and replaced The urine should drain away freely into a bottle beneath the bed Spigots should not be used at any stage In view of the local irritation caused to the urethra by rubber catheters Chassar Moir suggests the use of plastic tubing for drainage This causes the minimum of irritation and is a refinement in technique worth considering If the fistula involves the urethra, the repair is much less likely to hold if a rubber catheter remains in it It is advised, therefore, in these cases that the bladder should be drained following operation by catheter put through a counter-bladder drainage opening higher up in the vagina and not initially through the urethra A catheter can be inserted by passing a curved trocar and cannula through the fistula involving the urethra and out into the vagina at a level 1 in higher up The trocar is removed and through the cannula a catheter of small calibre is inserted in the retrograde direction The cannula is removed while the catheter is held in position A suture is then put into it and through some adjacent tissue to maintain its position The bladder is drained in this way for ten days following repair of the urethrovaginal fistula If this is done and no urethral catheter is used initially, many urethrovaginal fistulæ will close at the first operative attempt, which would certainly not otherwise be the case if a permanent catheter was put through the urethra for ten days The catheter inserted through the back of the bladder high up in the vagina is removed after ten days, by this time the urethral fistula is healed As there is no loss of tissue at the site of the catheter insertion the perforation closes within three or four days No sutures are necessary After removal of the catheter from the bladder a small urethral catheter is then inserted per urethram to facilitate closure of the counter-opening The total drainage period of the bladder in these cases is thus fourteen to seventeen days This may be a little longer than is necessary In no case has *there been leakage from the counter-opening beyond five days This method is* considered a great improvement over urethral drainage in cases where the urethra is involved in the fistulous track The duration of drainage of the bladder can be decreased as greater skill is attained in the technique of local repair operations The bladder was drained for three weeks in my earliest cases, where the urethra was not involved, later for two weeks and finally for only one week It is noted with interest that Rendle-Short, having initially used a longer period of drainage, now advocates the use of catheter drainage for forty-eight hours only, suggesting that a very high degree of skill has been attained by ample practice in the performance of this operation

Suprapubic drainage is not used in African patients nor is transverse vesical approach encouraged because of the great tendency to keloid formation if the prepubic pad of fat is damaged Such an irregular keloid may be most troublesome Following successful local repair of vesicovaginal fistulæ, and removal of the urethral *catheter, there is in some cases slight stress incontinence from the urethra* for three or four days This tends to occur if the catheter has been left in for more than fourteen days This is probably due to the catheter interfering with the

the patient, not having fully understood the implications of the operation, subsequently returned after about two years, demanding that the vagina should be opened again The position was explained to her and advice given These patients relieved of total incontinence by colpoclesis should be told that it is unwise to disclose the nature of their operation to their friends or neighbours, otherwise hurtful remarks may be made which are detrimental to their prestige Cases of colpoclesis require periodic courses of sulpha drugs and antibiotics, as they are predisposed to ascending infection in the urinary tract

If a vesicovaginal fistula cannot be closed locally the method of transplantation of the ureters into the rectum or sigmoid colon can be used It is essential before such an operation is considered to see that the anal sphincter is good and that there is no rectovaginal fistula present The rectum should therefore be tested in all cases initially by introducing 1 pint of coloured fluid Water containing methylene blue is suitable in order to detect if any of the coloured fluid escapes from the rectum per vaginam Transplantation of the ureters should be undertaken only if the rectum is intact and the sphincter working efficiently

Transplantation of the ureters may be undertaken by the transperitoneal route or the extraperitoneal approach The extraperitoneal route has no advantages over the transperitoneal method and it necessitates an incision on both sides of the abdomen unless a transverse lower abdominal incision is used, when the extraperitoneal position may be approached at the ends of the transverse incision In the transperitoneal operation the patient is placed in the Trendelenburg position The small intestine is packed away and the ureters are then individually isolated They are first palpated between the fingers, and a ring forceps put round them before the peritoneum is incised, so that they do not slip away and so become difficult to find a second time A small vertical incision is made over each and run down to the bottom of the pelvis, permitting access to the lower end of the structure on each side The left ureter is more difficult to isolate than the right, being embedded in much fatty tissue at the base of the sigmoid mesocolon Removal of the loose periureteral areolar tissue should be avoided as far as possible, as it carries the ureteric blood supply There are three principal methods of inserting the ureter into the rectosigmoid colon (Fig 161) the method of Coffey,[34] subsequently modified by Grey-Turner, the technique of Nesbit,[35] and the procedure of Mathisen,[36] as used in Norway

In the Coffey method the ureter, having been tied off and divided above the ligature at its lower end, is inserted through a perforation wound at the base of a longitudinal muscle incision in the sigmoid colon The ureter is fixed by a stitch brought through the walls of the colon, ½ in lower down Surface reinforcing sutures are used over the position of the insertion of the ureter in the wall of the gut and protective thread stitches are placed over the holding suture to prevent bowel content leakage Fatty masses attached to the bowel are also sutured with thread round the area of entry of the ureter into the gut The method depends largely on retention of the ureter by adhesion formation This technique is dangerous and carries a high mortality rate, 25 per cent being usual

The greatest advance in ureteric transplantation was contributed by Nesbit, who introduced the mucous membrane to mucous membrane junction between

again above the stricture about four years after the original operation A bladder stone came through the fistula This brought the necessity of periodic urethral dilatation to our notice Following successful local repair of a bladder fistula the patient is recommended to empty the bladder two-hourly during the next two months rather than permit it to become over-distended These patients who before the operation were social outcasts because of their disability and the constant offensive smell of decomposing urine soon become psychologically readjusted to their family circumstances In some of the cases the patients have been seen again at hospital within one year with a further pregnancy nearing full term Great care must be exercised in the conduct of the subsequent delivery In most cases a Cæsarean section is recommended followed by a symphysiotomy By this means *the woman gets a live child and her pelvic measurements are permanently improved* so that she may perhaps be able to have a further pregnancy and a normal delivery Most fistula cases are associated with poor pelvic measurements which caused the original difficult labour

Repair of rectovaginal fistula is along the same lines of a three layer repair after adequate release of adjoining tissues If the fistula is in a very low position and the tissue between the lower end of the fistula and the anus is very thin, it is much easier to divide this bridge of tissue initially and then undertake an extensive repair, reconstructing the rectal sphincter after the manner of a colpoperineorrhaphy rather than attempting closure of the fistula alone without opening it up completely It has in the past been a standard practice to recommend a preliminary colostomy prior to attempts at closure of rectovaginal fistulæ, but it has been found in personal experience that the closure rate was better when no colostomy was undertaken than when one was performed In view of the added inconvenience, and without any particular advantage being gained preliminary colostomies have been given up Patients in the tropics who have very little privacy due to communal living find colostomies particularly distasteful With adequate sterilisation of the large gut by sulpha drugs before operation the results are very good without colostomy A rectal tube can be used in the rectum for one week to ten days to prevent a rise of gas pressure locally following operation The patient is kept on a low residue diet for forty eight hours before and two weeks following operation In this way the bowels do not act for at least a week following operation An enema can subsequently be given to facilitate the passage of motions

[illegible]

vagina, the urine escapes through the rectovaginal fistula and so is passed per anum periodically as required Control is maintained by the anal sphincter If this operation is undertaken with the consent and foreknowledge of the patient it is a most satisfactory procedure in cases which cannot otherwise be dealt with satisfactorily The clitoris and edges of the labia are excised complete The vaginal skin is turned in and the vulva thus closed in three layers completely from end to end A rubber tube is then put through the anal sphincter and through the rectovaginal fistula into the compound bladder and vagina while the anterior wound is healing Five cases have been so treated by colpoclesis In one instance

side, thus covering the lower exposed inch of the ureter This prevents the ureter forming a band obstruction to a loop of small bowel which might otherwise be caught beneath it No ureteric catheters are required in the ureters as was previously recommended for the earlier types of operation The two ureters should be inserted at slightly different levels on the colon, not opposite each other This prevents undue constriction of the bowel due to puckering at the site of union which might otherwise take place

In the newer modified technique recommended by Mathisen a rectangular flap of the muscular layer of the colon is raised from the mucous membrane layer The upper edge remains attached This sheet of muscle covered by peritoneum is wrapped round the lower part of the ureter and sutured in position The union of ureter to mucous membrane of the colon is then made similar to that used in the Nesbit technique Finally the outer edges of the rectangular opening are sutured over the lower end of the ureter which already has the flap sutured to it In this way the junction is reinforced instead of the oversuturing alone as used in the Nesbit operation Fine thread should be used for the sutures This method has not been used personally, though it would appear to be a sound procedure Each method has been an improvement on its predecessor One elderly patient in very poor nutritional condition formed a local abscess following operation This was found to be due to a small leakage of urine The fluid subsequently evacuated from this abscess smelt of offensive urine The patient recovered quite quickly

It is usual to transplant the ureters into the sigmoid colon, but some workers advocate transplantation into the cæcum This method has not been used in any cases at our clinic Bilateral transplantation of ureters has been undertaken in all cases, rather than implantation in two stages The operation takes one hour and ten minutes in most cases Care must be exercised to avoid overlooking two ureters on the same side On one occasion two consecutive patients were operated on on the same day and both found to have two ureters on the left side and one on the right If such a supernumerary ureter is overlooked the patient would still leak urine per vaginam because of urine entering the damaged bladder from the undetected ureter Following transplantation of the ureters a rectal tube is passed through the anal sphincter to withdraw the urine which enters the rectum With the Coffey technique the first ounce of urine is not usually passed for up to twenty hours following operation, this lag period may be alarming With the Nesbit technique the first ounce of urine is usually passed within six hours and freely after ten hours The urine passed in the first twenty-four to forty-eight hours contains some blood This is not of serious import The rectum is drained by the tube for one week

In cases where the patient suffers from pressure neuritis and leg weakness following difficult childbirth, there is very poor sensation about the anal canal and perineum for several months In these cases the patient is unable to hold fluid in the rectum or control it because of the loss of adequate sensation In other patients, fluid entering the rectum gives rise to a sense of diarrhœa and it takes a little time before adjustment to the new method of micturition is attained Some incontinence may occur at night when the patient is asleep Young women

the ureter and the colon By this technique the mortality for the operation has been reduced to the level of 1 per cent To avoid stenosis at the site of uretero-intestinal junction he stresses the advisability of cutting the ureter obliquely to produce an elliptical orifice After the primary anastomosis is made, the opening in the linea coli is carefully sutured over the terminal ureter The ureter emerges at the upper end of this suture line, the sutures being inserted from the lower end of the incision up to the ureter This ensures some degree of tunnelisation of the

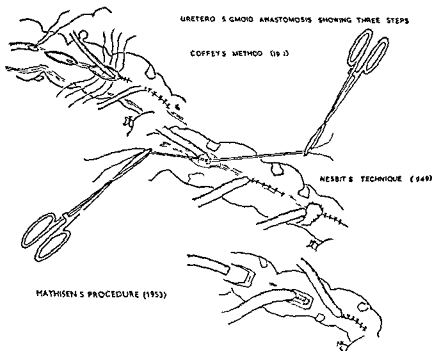


FIG 161
Diagrams showing steps in transplantation of ureters by three methods Coffey s method (1911) Nesbit's technique (1949), Mathisen s procedure (1953)

terminal ureter Thread is used throughout in this anastomosis Six sutures are used in the original mucous membrane to mucous membrane junction The first two sutures inserted are used as " stay " stitches and are held by fine artery forceps so that by gentle traction the first two edges to be sutured are held parallel to each other Two stitches are used on each side of the stay stitches so that six sutures in all are used in the primary junction On the ureter side the stitches go through mucous membrane and muscle coats, but on the sigmoid side mucous membrane only is held in the stitch About four thread stitches are used to close the incision over the terminal ureter along the linea coli Fatty tags may be further placed round the junction and sutured in position, but this is not essential The outer free edge of peritoneum from the floor of the pelvis corresponding to the original bed of the ureter is finally sutured to the side of the sigmoid colon on each

the ureters was undertaken up to fifteen years ago still seem healthy and well Many cases, of course, have not been traced It seems to be incorrect to say that all patients in whom transplantation of the ureters has been performed will certainly not live more than three years In following up cases to note the ultimate results of ureteric transplantation, several of the cases were found to have died following a further obstructed labour In most cases where a woman returns to hospital with a further pregnancy following vesicovaginal fistula operations, Cæsarean section has been recommended, as in most cases the woman has no live child and the pelvic measurements are poor There is the additional disadvantage of extensive vaginal scar tissue present

PROLAPSE OF PELVIC STRUCTURES

In many parts of the tropical world hospitals are few and far between Treatment in specialised departments is therefore not freely available to a large proportion of the population who may require these services Patients are sometimes unwilling, for economic or domestic reasons, to travel long distances for treatment of surgical conditions In these circumstances local doctors are requested to carry out operations for late complications of childbirth which require skilled and efficient treatment if good results are to be expected It is proposed to indicate here, from practical experience, the operations which are most suitable and easy to perform for the treatment of the various forms of pelvic prolapse

Visceral herniations of various sorts are more common in the lower than the upper abdomen This is due to the greater effect of gravity in the lower abdomen than in the upper abdomen It is also predisposed to by the disposition of the various muscular and fascial tissues in the construction about the pelvis The natural orifices of the body constitute a potential source of weakness at several sites The greatest single predisposing factor in the prolapse of pelvic structures in female patients is childbirth At this time there is essentially marked stretching of all pelvic structures There is rupture of deep muscle layers about the perineum as well as, in some instances, laceration of perineal skin Necrosis of the wall of the vagina in some instances predisposes to local prolapse of the bladder through a vesicovaginal fistula Malnutrition and advancing age have an important bearing also on the frequency of these conditions Different varieties of prolapse may affect the rectum, the vagina and the urinary bladder Prolapse of the rectum through the anal sphincter is not usually considered a direct complication of childbirth It has already been noted most often in infancy and old age It is more common in men than in women Deterioration in general health and raised intra abdominal pressure due to urinary obstruction are important ætiological factors in its production

Rectal prolapse of the rectocele type is the direct result of childbirth There is in these cases varying degrees of disruption of the pelvic floor The condition involves the lower half of the vagina posteriorly It can usually be satisfactorily treated by a systematic repair, after removing a triangular piece of skin of the posterior vaginal wall, with subsequent approximation of the deep muscle layers over the lower 2 in of the rectum Strong chromic catgut is suitable for the

seldom have difficulty in holding urine in the rectum if the anal sphincter is adequate They pass about 8 oz of urine every two hours following operation In the case of the women of the older age group there is much greater difficulty experienced in controlling the fluid in the rectum even though the anal sphincter is good In order to help in these cases the patients are advised to refrain from drinking any water after 6 P M so that the rectum does not fill up excessively during the night They must also go to bed having emptied the rectum If they can be wakened once during the night to empty the rectum voluntarily this helps greatly and they may sleep without soiling themselves As well as curtailing the fluids by mouth a method has been devised whereby a pituitary preparation, known as " Disipeden," marketed in powder form by Payne & Burns, London, England, or " Piton Snuff," by Organon, is insufflated into the nose The powder is blown into the nostrils so that it is slowly absorbed by the nasal and hyperpharyngeal mucous membranes This substance has an inhibitory action on the formation of nocturnal urine Following its use very little urine is secreted during the next eight hours It is thus possible by this means to decrease the formation of urine at night during the sleeping hours This preparation, originally introduced for the treatment of enuresis, was tried in a few cases with fair success in 195˚, it is rather expensive and therefore only a limited number of patients can afford to use it freely Rendle-Short suggests the use of a special rectal plug in cases where there is difficulty in rectal control and has found this an advantage in cases where the tone of the anal sphincter is poor

The success of repair operations on vesicovaginal fistula cases depends largely on the selection of cases submitted to operation With improving skill in technique there is a great tendency to use extensive local repairs in cases which would previously have been treated by transplantation of the ureters If only easy cases are locally repaired a high rate of cure will be recorded, whereas if all cases are treated by local repair irrespective of severity a relatively poor percentage cure will be achieved Statistics are therefore somewhat deceptive If an 80 per cent success rate is obtained on undertaking local repair the results can be considered very satisfactory In some cases where local repair is attempted on a very large fistula the defect may be reduced to a very small size though not closed In these cases a second repair at one month later is frequently successful The case is ultimately cured by the two operations In a few personal cases three attempts were made before a very large fistula was finally closed The mortality rate from local repair operations is remarkably low, varying between 1 and 3 per cent The mortality rate following transplantation of the ureters by the Coffey technique is about 25 per cent Using the Nesbit technique the mortality rate is 1 to 2 per cent only No cases were lost personally when this latter technique was used in seventy-two cases

There has been considerable controversy on the subject of interference with general health following transplantation of the ureters into the rectum The reabsorption of certain salts back into the circulation may seriously interfere with the blood chemistry and electrolyte balance The risk of ascending infection is always present These two dangers seem, on clinical grounds, as noted in patients in the tropics, to be grossly overstressed Many cases in which transplantation of

This simple observation is made the basis of the Watkins[37] operation In this operation, after replacement of the procidentia, the abdomen is opened and the peritoneum at the base of the uterovesical pouch is divided transversely The deep tissues between the bladder and vagina are separated widely to form an open pouch The fundus of the uterus is then rotated forward and inserted into the cavity so formed The flap of peritoneum released is sutured over the fundus of the uterus and attached along its dorsal aspect The uterus by this means (Fig 162) is firmly

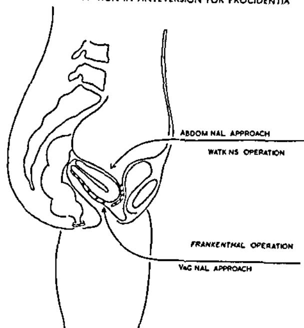


FIG 162
Diagram of sagittal section showing anteversion operation for procidentia
Abdominal approach, Watkins' operation, Vaginal approach Frankenthal's operation

fixed in such a position that the fundus cannot rise in the abdomen, and the cervix, pointing directly backwards, cannot descend Raised intra-abdominal pressure subsequently exerted from above downwards pushes the uterus bodily on to the anterior wall of the vagina, the fundus being lowermost and the cervix at a higher level The uterus is thus fixed in the reverse direction to that which it must assume if prolapse is to take place This type of operation is most suitable for women after the menopause who suffer from prolapse of the uterus of a second or third degree Frankenthal[38] undertook this procedure by the vaginal approach alone, entering the uterovesical space by an inverted T-shaped incision on the anterior vaginal wall, the bladder is carefully dissected off the uterine cervix It may cause dysmenorrhœa in younger women To deal with a procidentia by a hysterectomy alone is not very satisfactory A ventral suspension is likewise not followed by good results and recurrence is likely to occur Without radically altering the line of axis of the uterus, recurrence is very liable to take place

repair of the deep layers Monofilament nylon is used in the vaginal skin and perineum The amount of skin removed is judged by the local appearances and the points along the margins of the vulva which must be approximated to reduce the introitus to the normal size A small degree of infection in a colpoperineorrhaphy wound is almost inevitable It is desirable to give the patient a preliminary course of sulphaguanidine for some days before the operation is performed This reduces the coliform bacterial content of the lower bowel

A condition which is more difficult to recognise is an enterocele of the vagina This is really a herniation of the pouch of Douglas into the upper third of the vagina, and does not implicate the rectum directly There is a hernial sac present The swelling involves the upper half of the vagina and it contains loops of small intestine It is obvious on rectal examination that the swelling is not due to a protrusion forward of the rectum at all This condition can be treated either by a direct approach from below per vaginam, with the patient in the Trendelenburg position, or via the abdominal wall entering the recto-uterine pouch and withdrawing the excess of peritoneum entering the protrusion into the back of the vagina The pouch is obliterated by sutures inserted in its lowermost part, the adjacent tissues approximated and the excess peritoneum of the cul-de-sac removed Using the lower approach a transverse incision is made over the swelling in the upper and posterior part of the vagina A peritoneal hernial sac is found and opened With the patient in the tilted position the small intestine falls away into the upper part of the pelvis as soon as the air enters the peritoneal cavity The hernial sac is separated and withdrawn and the excess ligatured and excised It is then desirable to suture the stump to the posterior part of the uterine cervix within the abdomen The local incision is then closed The operation is simple and the results are reasonably good The patient is relieved of the swelling, and if measures are undertaken to decrease the risk of constipation recurrence is unlikely

On observing many cases of prolapse of the uterus of varying degrees it is noted that in almost all cases of third-degree prolapse, or procidentia, the woman has no evidence of old-standing inflammatory pelvic disease, whereas in a woman who is suffering from "frozen pelvis," or extensive chronic parametritis with massive adhesions it would be quite impossible to dislodge the uterus from the pelvis through the vagina, even if much force was applied, as it is so firmly held in position by all the local structures adjacent to it

In cases of extensive pelvic infection it is noticed that the uterus is frequently markedly anteverted and firmly adherent in position This observation is of considerable importance when considering treatment of prolapse of the uterus Only if the uterus points downwards in the same line as the vagina and is free from adhesion to adjacent structures is it likely to prolapse Relaxation of the structures of the pelvic floor following childbirth is the factor concerned The length of a multiparous uterus is usually much greater than that which would pass through the vaginal passage if it assumed a position with its long axis in any other line than the vertical If a cork goes into the main cavity of a bottle it can be withdrawn by a loop of string passed round it in such a way that it is withdrawn along the line of its long axis If, however, the loop of string is passed round the cork when the axis is transverse to the line of entry of the cork, the cork cannot be withdrawn.

procedures where aponeurosis is used This simple method approximate *closely to the Millin technique, as it is performed by the retropubic route exclu* Fig 163 shows the various modifications of sling operations for stress inconti

Prolapse of the bladder through a large vesicovaginal fistula is n uncommon condition, Fig 160 illustrating a case of this type Treatment co in repair of the fistula, if this is possible, by a local approach Where the is large enough to permit of a bladder prolapse it is usually necessary to use a r incision of the Schuchardt type to get sufficient release of tissue to make c possible A Sabadini-Ducassou *combined operation may* also be *employ* local repair is not possible By means of transplantation of the ureters, with dev of the urinary stream, the bladder prolapse usually gets much smaller If the p is still uncomfortable as a result of the bladder prolapse six months or a year the transplantation of the ureters, the size of the mass can be reduced by diath of the bladder surface The button-like applicators are suitable for treatme these cases If the bladder is not treated it tends to form a troublesome pu discharge Patients seek advice because of the discharge rather than the redun of tissue present No attempt has been made to excise the bladder in these though this might well be possible and undertaken with advantage

REFERENCES

1 MACAFEE, C H G (1957) The changing face of obstetric practice and teaching *Cent* *Med* 3, 37

2 CH'EN WEN CHEN (1957) Clinical analysis of 8,063 cases of painless labour by ps prophylactic method *Chin med J* 75, 337

3 FUENTES, J, PUERTOLLANA, N & BAENS, A (1956) Afibrinogenæmia as an ob complication *J Philipp med Ass* 32, 291

4 ENVERGA SANTOS, C, *GONZALES, H & VILLAROSA FERRER, L (1958) Post partum hæmor* *J Philipp med Ass* 34, 159

A st dy of a new and potent ergot derivative, ergo

d using it in obstetrical pra

7 BHAGAT, A (1953) Retained placenta *J Obstet Gynaec India*, 4, 7

8 Treatment of retained placenta in the presence of sepsis and exsanguin

9 ionary embolism by amniotic flu 17 (ii), 1245

10 *Med Maryland*, 30, 1

11 *Chin med J* 68 111

12 Complete inversion of the ut

13 *Docum Med geogr trop (A* 8, 236

14 BALASUNDRAM, C S (1954)

15 POLUSCHEV, F N (1957) treatment of asphyxia o

16 MAHFOUZ, N (1938) Urin

17 BOWESMAN, C (1955) Post pa

18 PRESTON, P G (1951) Transplantation of the ureters in treatment of obstetrical vesicovag fistulæ *J Obstet Gynaec Brit Emp* 58, 282

19 RENDLE-SHORT, C (1956) Some notes on treatment of vesicovaginal fistula *E Afr me* 33, 271

In cases where uterine prolapse is of first or second degree only, the cervix being either only slightly below normal or reaching to the level of the vulva, the Manchester operation gives reasonably good results This operation consists in amputating the uterine cervix, tightening of parametric tissues by suturing them across the front of the uterus, with, in addition, an anterior and posterior colpoperineorrhaphy It carries a very low mortality rate Care must be exercised to avoid damage to the lower end of the ureters when this operation is performed

It should be remembered that following amputation of the uterine cervix the pregnancy rate in young women is reduced to a low level Not more than 10 per cent of women so operated upon during the child-bearing period of life subsequently become pregnant Those who do become pregnant are liable to lose the pregnancy by abortion Amputation of the cervix should therefore not be undertaken in young women who are anxious to have more children An anterior and posterior colpoperineorrhaphy alone usually suffices in these cases

Partial prolapse of the bladder through the anterior vaginal wall is termed cystocele It seldom worries patients unless it is associated with a degree of stress incontinence Stress incontinence or involuntary loss of urine per urethram on coughing, sneezing or raising the intra-abdominal pressure in normal activity is a condition for which patients seek treatment quite often This condition is due to stretching of pelvic tissues during childbirth which permits of relaxation of the tissues suspending the urethra at the back of the pubis This leads to decrease in the normal angulation of the urethra close to the neck of the bladder with a consequent escape of urine per urethram There is very little evidence of sphincteric muscular control of the normal female urethra It seems that the mechanism of control *of micturition depends very largely on the angulation of the urethra, close* to the neck of the bladder It can be noted as an illustration of this mechanism that if a rubber catheter is connected to a funnel the flow of water through the catheter can easily be obstructed completely by angulation of the rubber tube to a little more than a right angle It is not necessary to squeeze the catheter locally to stop the flow of water, the angulation alone is sufficient to obstruct it completely As the angulation is released the flow of water starts again it can be stopped again by increasing the angulation In female patients micturition is started by raising the intra abdominal pressure which lifts the bladder slightly from below upwards and forwards This virtually removes the angulation, permitting of the escape of urine Decrease in angulation of the urethra can be produced either by raising the bladder, as in normal physiology, or relaxing the angulation mechanism as happens when the local supporting tissues at the back of the pubis are unduly stretched following childbirth Operations designed to reduce the calibre of the external urinary meatus are not satisfactory in controlling stress incontinence

The basic principle in treating stress incontinence is to undertake any procedure which increases the angulation at the bladder neck To achieve this several operations have been designed, one of the earliest being that of Goebell[39] Later, those of Aldridge[40] and Millin[41] were introduced In the first operation the skin of the lower abdomen is opened by a vertical subumbilical incision down to the pubis A vertical strip of aponeurosis is raised in the middle line like a 1 cm wide piece of tape It is easier to raise the strip aponeurosis a little to one side

18

Infections and Ulceration

PROTOZOAL INFECTIONS

THE biological balance between human beings and the lower forms of organisms is so adjusted that benefit is gained by the presence of certain bacteria in the intestinal tract of the human subject Only when man is infected with organisms which are detrimental to his well-being is disease caused By comparing conditions bearing some relationship to each other it is often possible to gain an advantage regarding the procedure of investigation and methods of treatment

Certain clinical entities are regularly referred to surgical departments for treatment of well-known abnormalities which are the late result of specific infections An example of this is illustrated by poliomyelitis Mild cases of this disease are very easily overlooked at the early stage as they cause little incapacity other than temporary indisposition At a later time a muscular weakness occurs, and finally contracture develops in a limb and the diagnosis then becomes apparent Late complications essentially require some surgical procedure to rectify them

Many forms of disease are primarily infective in origin Malaria has already been considered, having very special characteristics and being very widespread throughout the tropical and subtropical world Similarly, amœbic infection has been dealt with Three others will now be considered, with special reference to the surgical implications, these are toxoplasmosis, trypanosomiasis and leishmaniasis They are caused by three quite different organisms Fig 164 depicts the appearance of these three organisms, drawn on the same scale for comparison Toxoplasmosis is a specific infection occurring in many animals and birds Man is also liable to infection The condition is due to a protozoal or unicellular organism of from 4 to 7 microns in length The name is derived from the word *toxon*, meaning a bow The organisms have a bow-shaped appearance *They look rather like sausage-shaped female malarial gametocytes* The organism is found in the interstitial tissues of the host The reticulo-endothelial cells are frequently infected It has a particularly strong affinity for the nervous system and is therefore said to have a marked "neurotropic" tendency The parasite does not infect the individual red blood cells

Toxoplasmosis was first discovered in animals in 1908, but the first proved case of toxoplasmosis infection in man was described only in 1939, in North Africa Between 1940 and 1950 a small number of cases were reported from various places Since 1950 reports of cases in the human subject have appeared with increasing frequency and in growing numbers Toxoplasmosis is a widespread infection It is probably more common in the tropical world than in non-tropical countries

during antibiotic treatment *W Afr med J* 2, 79
25 VON DITTEL, H (1893) Abdominale Blasenscheidenfistel—Operation *Wien*
6, 449
26 LEGUEU, F (1933) Les fistules vesicovaginale *Rev Gin de Clin et de Therap*
27 TRENDELENBURG, F (1890) Über Blasenschneidefisteloperationen und übe
langerung bei Operationen in der Bauchohle *Samml klin Vortr* —355 *Chi*
28 WILLIAMS, E (1948) Some urological problems in gynæcological surgery
Med 41, 143
29 ALEKSANDROV, E K (1958) Certain approaches in surgical treatment of uroge
women *Akush Ginek* (*U S S R*), 1, 71
30 SCHUCHARDT, K (1896) Weitere Erfahrungen über die Paravaginale Opera
klin Chir 53, 473
31 SABADINI, L & DUCASSOU, J (1951) De la cure des fistules vesico-cervico-vagin
ses par les voies—combinese et urethroplastic secondaire *J Chir Paris*, 67
32 MOSSOP, R T (1955) Laryngoscope as retractor in repair of vesicovaginal
Afr J Med 1, 197
33 UEBERMUTH, H (1951) Zur operationstechnik des blasenscheiden fistelvers
Gynäk 73 (2), 1451
34 COFFEY, R C (1911) Physiological implantation of the severed ureter, or com
into the intestines *J Amer med Ass* 56, 397
35 NESBIT, R M (1949) Elliptical anastomosis in urologic surgery *Ann Surg* 1
36 MATHISEN, W (1953) A new method for uretero-intestinal anastomosis *Surg*
96, 255
37 WATKINS, T J (1912) Transposition of the uterus and bladder in treatmen
cystocele and uterine prolapse *Amer J Obstet Gynec* 65, 225
38 FRANKENTHAL, L E (1909) The vaginal operation for prolapse of the uterus
Ass 53, 16
39 GOEBELL, R (1910) Zur operativen beseitigung der angeborenen inconti
Z Gynäk Urol 2, 187
40 ALDRIDGE, A H (1942) Transplantation of fascia for the relief of urinary stres
Amer J Obstet Gynec 44, 398
41 MILLIN, T J (1947) *Retropubic Urinary Surgery*, p 184 Edinburgh Living

of placental origin from the mother, who harboured the disease in an asymptomatic form In some cases there is a history of association with pets cats, dogs, rabbits, guinea pigs or birds In order to illustrate more fully the type of case in which toxoplasmosis might be suspected and looked for, the clinical observations on several cases are

1 [illegible]
2
3
4
5 A child with inability to walk after the age of 2 years
6 Peculiar weakness of the limbs simulating the neuropathy—weak legs
7 Congenital deformities—hare-lip, cleft palate
8 Mental disturbance with spastic fits
9 Ages of patients seen were 3 months, 5, 7, 8 and 12 years
10 Cases most frequently seen are congenitally abnormal children

In a further series of cases observed by Hiraoka[2] the frequency of speech defects in children was very conspicuous All five children in the second series were noted to have difficulty with speech and in some cases there was obvious backwardness in mental development Cerebral calcification was noted very frequently on X ray examination of the child s skull Rawal and Patal,[3] taking a particular interest in eye diseases, noted a positive toxoplasma skin test in a high proportion of children suffering from congenital eye defects Here, again the tendency for the parasite to attack the nervous system, of which the eye is a part, is conspicuous Rawal also noted the frequency of cerebral calcification in children with this infection It is certainly worth X raying all children with cerebral abnormalities to see if this sign is present The X ray appearances may give an obvious lead with a view to prompting further investigations

The close association between toxoplasmosis and animal pets is conspicuous in some cases in older children and suggests that the condition may be contracted in this way Lainson[4] notes that toxoplasms have been isolated from human sputum, presumably these have come from a pulmonary infection Possibly animal respiratory secretions also act as a source of infection Non-congenital infections in children still show a marked neurotropic tendency as opposed to the findings in adults who exhibit a much more visceral type of clinical condition Gibson and Eyles,[5] investigating a case in a negro child in Tennessee, U S A, found that several birds and animals in the vicinity where the child lived were infected with toxoplasmosis The results of the investigation were as follows

	Positive	Infected
Cats tested (35)	7	20 per cent
Mice tested (121)	7	6 per cent
Ducks tested (3)	2	67 per cent
Chickens tested (7)	2	43 per cent
Pigeons tested (16)	1	6 per cent

In the case of this child the Sabin-Feldman dye test was positive (1 in 16,000)

With a view to bringing this condition to the notice of surgeons in the tropics a brief description of the clinical manifestations is presented Toxoplasmosis manifests itself in two forms, the adult form and the infantile form, which might appear to be completely different diseases, although they are caused by the same organism This phenomenon of dual or triple presentation by one organism is well known In adults particularly it gives rise to an acute fever with chills and rigors There is an associated skin rash The patients develop an acute pulmonary congestive condition which is very often fatal Extensive visceral changes take place affecting particularly the reticulo-endothelial cells of the spleen and the

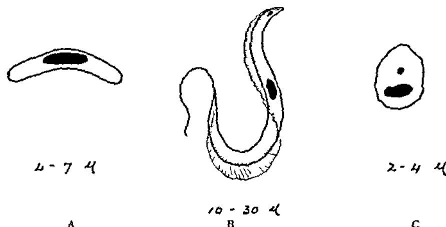


Fig 164

Diagram representing A Toxoplasms, B, Trypanosomes C, Leishmania

liver The causative organism has been found on section of lung, liver and spleen In adults the brain is seldom obviously infected and there are usually no signs directly referable to the nervous system during the illness Some patients recover and harbour the parasite in the tissues, although apparently in good health The importance of this "carrier state" is that women becoming pregnant may transmit the condition to the child as a congenital infection In children who are congenitally infected by toxoplasmosis, the organism shows a strong neurotropic tendency, giving signs and symptoms directly referable to the nervous system in which it becomes lodged The second form of the disease is therefore noted practically always in children between the ages of 1 and 10 years, more rarely up to the age of 20 Children also contract the disease from infected animals or birds The method of spread is not certain There is probably, though as yet unknown, a vector transmitting the disease as with the other protozoal infections of the group

Hiraoka[1] has reported two series of cases, five patients in each set, noted in Japan In the first series, noted between 1955 and 1957, the organism was confirmed microscopically in all cases All cases manifested themselves as disturbances associated with the nervous system The infection was thought to be

to show positive results than the first. Often three passages are necessary before a positive result is obtained. The results of cerebrospinal fluid inoculation into guinea pigs is better if the fluid is taken from the lateral ventricle rather than from the spinal theca by lumbar puncture.

Where a woman produces a congenitally abnormal child it is worth testing her by the Sabin-Feldman dye test for toxoplasmosis. If she presents with a further pregnancy without having been investigated, some amniotic fluid should be removed for investigation by intraperitoneal inoculation of a guinea pig and if necessary with repeated animal passages.

The brain pathology noted in cases of toxoplasmosis in children is a low grade meningo encephalitis and centrally placed brain lesions. These deep seated areas of infection produce local granulomatous masses with central caseous formation. The degeneration products so formed have a marked tendency to absorb and fix calcium salts and so cause opacities on X-ray examination of the brain. The calcification appears in the areas about the ventricles and is therefore usually "centrally placed". Garcia,[11] investigating post-mortem subjects whose decease was thought to be due to toxoplasmosis, found that the auger punch method of removing brain tissue via the transnasal route was *very efficient*. *By this method* tissue could be removed from the brain without the disfigurement of an open post mortem examination being apparent. Most of the cases investigated had suffered from epileptiform manifestations before decease. Skin testing with "toxoplasmin" gives about 90 per cent positive results in known positive cases of toxoplasmosis.

Women frequently bring young children to surgical clinics requesting examination and treatment for conditions which might well suggest a diagnosis of toxoplasmosis. Unless the nature of toxoplasmosis is appreciated and the type of signs which it gives rise to is known, these children will certainly be sent away without adequate investigation being undertaken, as the condition is not recognised. *It is little comfort to a distressed mother to hear that nothing can be done for a weakly child.* There is even some satisfaction in arriving at an adequate diagnosis which can be confirmed by different means. If toxoplasmosis is diagnosed and confirmed in a defective infant, the mother should be investigated as being the likely source of infection. A Sabin-Feldman dye test should be performed as well as a preliminary skin test. If the mother is the source of infection to the child, the test will presumably be positive. A woman may be infected with the condition *and carry* the infection for many years without showing any symptoms; she then transmits the disease to her offspring.

Many drugs have been investigated in an effort to find an effective treatment for this serious condition. The regime of treatment suggested by Hewson[12] is *sulphadiazine, 1 gm.* per 60 lb. of body weight daily. Three suitably divided doses are giv[illegible] per 60 lb. body weight [illegible]rocortisone, 80 mg. daily [illegible]ld be from seven to ten days' duration. Rubin[13] *also recommends sulpha* drugs and pyrimethamine in combination. The two drugs given together are much more effective than either given alone or separately. A pregnant woman with a positive

De Roever Bonnet,[8] investigating slaughter house animals for toxoplasmosis, found thirteen animals positive out of seventy-seven examined (16 8 per cent.) Brain specimens were found to be positive on passage cultures

The Sabin-Feldman dye test [7] constitutes the most conspicuous advance in the detection of toxoplasmosis in recent years (1948) These workers noticed that on mixing a culture of toxoplasms with normal serum the toxoplasms which were not taken up by leucocytes but remained in the free extracellular position, stained very darkly when the serum used was taken from a person who had not suffered from toxoplasmosis If the serum used in the test was taken from a patient known to have suffered from toxoplasmosis in the past, the toxoplasms remaining in the extracellular position failed to stain well The conclusion is therefore

1 Negative test shows strong staining of toxoplasms in the extracellular position
2 Positive test shows weak staining of toxoplasms in the extracellular position

It is necessary to maintain a laboratory culture of toxoplasmosis for the performance of the test The degree of positivity is estimated by diluting the suspected serum and seeing in what dilution the failure of staining is still detectable

As toxoplasmosis is not a common condition and there may be difficulty in maintaining a culture of toxoplasms for the Sabin-Feldman dye test, Awad [8] has used the spores of *Sarcocystis tenella* to replace the toxoplasms Sarcocystis resembles toxoplasmosis very closely and is related to toxoplasmosis morphologically Sarcocystis is a disease often affecting sheep The cysts can be found easily in the wall of the œsophagus, they are sufficiently large to be seen as a visible nodule they also occur elsewhere in muscular tissues The nodule is dissected out and the spores liberated by gentle teasing out in saline. The ease of availability of spores of sarcocysts make the test very valuable The results of the Sabin-Feldman dye test are the same whether toxoplasms or sarcocyst spores are used in testing patients' serum for immunity

An estimation of the percentage of persons who have suffered from toxoplasmosis, at some time in the past, has been made by Gibson and Coleman,[9] working in Guatemala and Costa Rica Immunity tests indicated that from 50 to 90 per cent of the local populations had previously been infected with the condition In England this immunity test rate is 10 per cent Schmidke,[10] investigating the relationship between toxoplasmosis and congenital infection from the mother, noted that toxoplasmosis became obvious almost invariably in babies and young children Most of the children were congenitally defective Many of his cases were proved by finding the organism in sections of the nervous system post mortem

The best method of detecting toxoplasms in young children is by aspiration of cerebrospinal fluid from the lateral ventricle of the brain The needle should be entered in the lateral aspect of the anterior fontanelle The fluid aspirated is injected into the peritoneal cavity of a guinea pig The brain of the guinea pig is later sectioned for toxoplasms Some brain tissue is taken and emulsified and further injected into another guinea pig The second guinea pig is more likely

patients with the condition are asymptomatic Akwei[15] discovered some outbreaks of trypanosomiasis in West Africa by routine examination of blood films in patients who were quite asymptomatic The virulence of the disease varies greatly from place to place Patients are sent on rare occasions to surgical clinics for the removal of a chronically enlarged gland in the neck which is said to be of many years' duration but which on gland puncture and examination of the juice removed is found to contain trypanosomes The patients in such cases usually have no obvious symptoms of sleeping sickness, and may come from a district in which sleeping sickness is not thought to exist

Trypanosomiasis in European patients in the tropics is in most instances a much more acute febrile illness than in African patients In no instance has a trypanosomic chancre been personally seen in an African patient, but a trypanosomic chancre has been noted on two or three occasions in European patients who contracted the disease, as seen in Gambia, West Africa In one instance a very acute area of inflammation, like a boil, developed in the right loin The patient had been running a high temperature for about two weeks in a bush station and suffered from severe headaches The headaches had not been improved by taking quinine (1937) On seeing this unusual inflamed area, a blood count was suggested and in the film many trypanosomes were found On rare occasions a patient showing a marked continuing drowsiness may be thought to have sleeping sickness, although investigations for the disease are all negative In these cases a frontal lobe brain abscess should be suspected secondary to a chronic frontal sinusitis One such case was noted where the patient slept almost persistently for a month till a suspected brain abscess was opened, after which the child brightened up quickly and recovered

Leishmaniasis manifests itself in three distinct forms

1 Cutaneous leishmaniasis, also termed "oriental sore" or "Delhi boil"
2 Kala-azar, or post-cutaneous visceral leishmaniasis
3 Espundia, South American forest yaws, or mucocutaneous leishmaniasis

The term "forest yaws" is a misnomer without appreciation of the true nature of the condition Fig 165 illustrates a case of this type in a small child in West Africa, where such a differential diagnosis between yaws and leishmaniasis or even rhinoscleroma might well be considered The protozoal organism responsible for leishmaniasis in the human subject is not at all unlike a toxoplasm but is of smal ... one
large nucleus
of these orgar
develops a flagellum both in the experimental animal and in culture on artificial media, when it assumes a very much larger size—about *10 to 15 microns* In this larger form it bears a remarkable resemblance to a trypanosome of sleeping sickness, although the flagellum is terminal in position only as opposed to the undulating membrane of trypanosomes which extends along the main body of the organism
... the order of 10 to 20 microns
American
of about

Sabin-Feldman dye test should be treated with these drugs to prevent congenital toxoplasmosis in her child

In visceral tissues taken from experimental animals suffering from toxoplasmosis it is not unusual to find ten to fifty toxoplasms grouped together in a mass as though they bore some relationship to each other To this localised mass of organisms the term "pseudocyst" is applied, for although the organisms live in a conglomerate mass there is no true cyst wall This pseudocyst formation is reminiscent of the pseudocyst formation noted in South American trypanosomiasis or Chagas' disease Large collections of these organisms of Chagas' disease are commonly found in the heart muscle or the muscle tissue elsewhere Koberle [11] noted the very high incidence of positive skin tests for Chagas' disease in cases of children suffering from Hirschsprung's disease or megacolon He found that in many cases section of bowel tissue removed at operation contained the organisms in the wall of the gut He suggested that there might be a neurotoxic substance released from the pseudocyst causing a degenerative effect on the nerve plexus of the gut involved, hence he considered Chagas' disease to be a likely ætiological factor in the production of megacolon This note is here included as an appropriate link indicating a possible common group factor between toxoplasmosis and South American trypanosomiasis This neurotropic damaging factor so well known in toxoplasmosis and the possible neurotoxic factor of Chagas' disease suggested by Koberle is of considerable significance The common pseudocyst formation seen in both conditions suggests the possibility that toxoplasmosis may also be an ætiological factor in Hirschsprung's disease or megacolon It is conspicuous that megacolon tends to occur in children of the same age group—namely, 1 to 10 years old The possible correlation between Hirschsprung's disease and toxoplasmosis might be investigated with advantage Whereas the trypanosomes of Chagas disease resemble the trypanosomes of African sleeping sickness when they are in the blood stream, being about 20 microns long, they form a much smaller organismal form of the leishmanial type in the tissues, approximating toxoplasms in appearance

Chagas' disease or South American trypanosomiasis is reported to manifest itself as a primary inflammatory lesion on the skin representing the site of entry of the parasite following an infected bite from a *Triatoma* bug An associated adenitis develops There is fever, marked tachycardia, muscle pains and rigors Areas of skin ulceration sometimes occur Œdema about one eye is very commonly seen and œdema of the scrotum in male children is also frequently noted In the late stages visceral invasion causes gross interference with function of the heart, lungs, liver, spleen and kidneys The brain also becomes infected with trypanosomes, and this predisposes to secondary bacterial meningitis Primary trypanosomic meningitis is a frequent terminal factor in infants Terminal myocarditis is usual in adults

The trypanosomes of African sleeping sickness, another member of this morphological group, have also a marked neurotropic tendency The tendency is so marked that it gives rise to the name of the disease "sleeping sickness," which is due to an encephalitis or subcortical brain infection African sleeping sickness *per se* has few surgical implications Some low-grade cases of sleeping sickness due to *Trypanosoma gambiense* almost certainly recover without treatment Many

patients with the condition are asymptomatic Akwei[15] discovered some outbreaks of trypanosomiasis in West Africa by routine examination of blood films in patients who were quite asymptomatic The virulence of the disease varies greatly from place to place Patients are sent on rare occasions to surgical clinics for the removal of a chronically enlarged gland in the neck which is said to be of many years' duration but which on gland puncture and examination of the juice removed is found to contain trypanosomes The patients in such cases usually have no obvious symptoms of sleeping sickness, and may come from a district in which sleeping sickness is not thought to exist

Trypanosomiasis in European patients in the tropics is in most instances a much more acute febrile illness than in African patients In no instance has a trypanosomic chancre been personally seen in an African patient, but a trypanosomic chancre has been noted on two or three occasions in European patients who contracted the disease, as seen in Gambia, West Africa In one instance a very acute area of inflammation, like a boil, developed in the right loin The patient had been running a high temperature for about two weeks in a bush station and suffered from severe headaches The headaches had not been improved by taking quinine (1937) On seeing this unusual inflamed area, a blood count was suggested and in the film many trypanosomes were found On rare occasions a patient showing a marked continuing drowsiness may be thought to have sleeping sickness, although investigations for the disease are all negative In these cases a frontal lobe brain abscess should be suspected secondary to a chronic frontal sinusitis One such case was noted where the patient slept almost persistently for a month till a suspected brain abscess was opened, after which the child brightened up quickly and recovered

Leishmaniasis manifests itself in three distinct forms

1 Cutaneous leishmaniasis, also termed " oriental sore " or " Delhi boil "
2 Kala-azar, or post-cutaneous visceral leishmaniasis
3 Espundia, South American forest yaws, or mucocutaneous leishmaniasis

The term " forest yaws " is a misnomer without appreciation of the true nature of the cc [illegible] in West Africa, [illegible] or even rhinos [illegible] responsible for leishmaniasis in the human subject is not at all unlike a toxoplasm but *is of smaller size, being only 2 to 4 microns In toxoplasms there* is only one large nucleus whereas in leishmania there is a major and minor nucleus Neither of these organisms has a flagellum in the human subject Leishmania, however, develops a flagellum both in the experimental animal and in culture on artificial media, when it assumes a very much larger size—about 10 to 15 microns In this larger form it bears a remarkable resemblance to a trypanosome of sleeping sickness, although the flagellum is terminal in position only as opposed to the undulating membrane of trypanosomes which extends along the main body of the organism [illegible] the order of 10 to 30 microns [illegible] nerican [illegible] f about

the same size The trypanosome of Chagas disease assumes the small leishmanial form when it leaves the blood stream and enters the fixed tissues, heart brain and bowel wall Leishmanial forms of African trypanosomes do not seem to have been identified Leishmaniasis and trypanosomiasis are both transmitted by an insect vector leishmaniasis by the *Phlebotomus* sand fly and trypanosomiasis by tsetse flies

Several animals act as a reservoir for leishmaniasis—dogs, cats or even horses —but probably most infections are spread from man to the carrying fly and then again to man Recently Heisch [16] noted that an outbreak of leishmaniasis in the Kitui district of Kenya was traced to infection in lizards Twenty four lizards were examined and four were found to have leishmania infections present in them



FIG 165
African child with nasopharyngeal ulceration
Case of A H Archambault M D F A C S

Lizards are seldom implicated as being carriers of disease hence this observation is of considerable importance in view of the frequency of lizards all over the tropical world

Leishmaniasis sometimes reaches epidemic proportions and the cases may be limited to quite small localised areas (Heisch [1]) The initial manifestations of leishmaniasis vary greatly in their severity In some instances the patients are very ill with a rash and a high fever Robinson Coles and Cosgrove [19] noted an outbreak of thirty cases of leishmaniasis in North Kenya Some cases developed a "typhoid state while some patients developed a mild malaise only Twenty two of the clinical cases had the diagnosis confirmed microscopically Fourteen cases out of thirty died—a mortality rate of almost 50 per cent The strain of the disease must have been very virulent If the patient gets over the initial attack spontaneously late visceral manifestations may be encountered These late cases develop a marked hypertrophy of the reticulo-endothelial tissues This is noted as massive enlargement of the liver and the spleen

The cutaneous manifestations of leishmaniasis are usually in the form of a rash and ultimate ulceration at various sites There is often early œdema of the upper lip and later ulceration about the nasal septum Skin ulceration frequently occurs about the forearms—a site not very usual for septic or tropical ulcers In several patients seen personally in the upper River Gambia, West Africa, in 1937, tissue was removed from such ulcers to see if leishmaniasis could be detected In no instance were the findings reported to be positive Reports returned indicated that the appearances were suggestive of leishmaniasis, but no *Leishmania* organisms could be detected These cases were sectioned following the observation that they showed little or no improvement on treatment with arsenical drugs, but showed rapid healing when pentavalent antimony preparations were given This was one of the points which suggested the possible diagnosis

In view of these findings it is interesting to note that Walters [19] reported one case of chronic ill-health in a boy from the South Kombo district of Gambia more recently, who suffered from marked chronic enlargement of the spleen On spleen puncture, *Leishmania* was found The patient was initially treated with antimony preparations, but showed toxic symptoms He was subsequently given stilbamidine isothionate by intravenous injections over a ten-day period The ultimate result was satisfactory The patient gave no obvious history of a previous dermal lesion suggestive of leishmaniasis, though doubtless a minor skin lesion representing the initial infection was overlooked

Leishmaniasis is probably not very common in the northern parts of West Africa, it is therefore not often considered in diagnosis In recent years several cases have been diagnosed and confirmed in Northern Nigeria At surgical clinics, where ulcers of various sorts are treated, this diagnosis should be considered throughout the tropical world This is particularly the case where there is low grade fever, marked anæmia and loss of weight associated with the ulceration

Leishmaniasis can usually be diagnosed by biopsy from the edge of early ulcers Smears of local secretion are also used in diagnosis followed by direct staining Curettage often gives positive results and finally gland puncture is used to demonstrate the organism as in sleeping sickness The material removed must be stained to demonstrate the organisms, as they do not move actively like trypanosomes so cannot be seen in wet preparations For the diagnosis of late cases where there is visceral involvement, the methods of spleen puncture and liver puncture can be used with the best chance of demonstrating the causative organisms The patients should be in hospital under observation for a few days when this procedure is used Bone marrow puncture is an effective measure in [illegible] some cases—for any of these procedures cases may be

[illegible] aking bone marrow biopsies with the ordinary sternal puncture needle is that frequently only a very small amount of marrow is removed, and this contains a large amount of blood The results are more satisfactory if the specimen submitted for examination contains much marrow and very little blood Reddy [20] has invented a special bone trocar and cannula made in such a way as to obtain the maximum amount of marrow without undue admixture of blood This instrument (Fig 166) has a gouge like cutting

the same size The trypanosome of Chagas disease assumes the small leishmanial form when it leaves the blood stream and enters the fixed tissues, heart, brain and bowel wall Leishmanial forms of African trypanosomes do not seem to have been identified Leishmaniasis and trypanosomiasis are both transmitted by an insect vector leishmaniasis by the *Phlebotomus* sand fly and trypanosomiasis by tsetse flies

Several animals act as a reservoir for leishmaniasis—dogs, cats or even horses—but probably most infections are spread from man to the carrying fly and then again to man Recently Heisch[16] noted that an outbreak of leishmaniasis in the Kitui district of Kenya was traced to infection in lizards Twenty four lizards were examined and four were found to have leishmania infections present in them



FIG 165
African child with nasopharyngeal ulceration
Case of A H Archambault M D F A C S

Lizards are seldom implicated as being carriers of disease, hence this observation is of considerable importance in view of the frequency of lizards all over the tropical world

Leishmaniasis sometimes reaches epidemic proportions and the cases may be limited to quite small localised areas (Heisch[17]) The initial manifestations of leishmaniasis vary greatly in their severity In some instances the patients are very ill, with a rash and a high fever Robinson, Coles and Cosgrove[18] noted an outbreak of thirty cases of leishmaniasis in North Kenya Some cases developed a "typhoid state" while some patients developed a mild malaise only Twenty two of the clinical cases had the diagnosis confirmed microscopically Fourteen cases out of thirty died—a mortality rate of almost 50 per cent The strain of the disease must have been very virulent If the patient gets over the initial attack spontaneously late visceral manifestations may be encountered These late cases develop a marked hypertrophy of the reticulo-endothelial tissues This is noted as massive enlargement of the liver and the spleen

isothionate all gave moderately good results Some relapses were reported The strain of leishmaniasis *probably varies greatly from* one area of the world to another, and this may account for *the discrepancies* in results of treatment reported with the same drug in different countries *The obvious necessity of covering open* lesions of any infective disease may have to be stressed to patients who do not appreciate the infective nature of the disease from which *they are suffering*

VIRUS DISEASES

The serious implications of virus diseases concern all medical workers *Only a limited* number of these diseases, however, give rise to forms of illness for which *the* patients are referred to surgical departments for treatment in the early stage of the disease or because of late complications The number of virus conditions is enormous In most of these infections many of the systems of the body are *involved There* is a tendency for each virus to show its most marked effect in a particular system The central nervous system is principally involved in *poliomyelitis and polioencephalitis, the same is noted with Japanese encephalitis* B, equine encephalitis may affect humans as well as horses This neurotropic tendency is particularly well marked in rabies Measles, also a virus disease, has a marked tendency to attack the lining cells of the respiratory system It also adversely affects the conjunctiva, causing on occasions corneal ulceration and blindness This is particularly the case in children who are suffering from a degree of avitaminosis A Trachoma attacks the cornea and the conjunctival surfaces of the eyelids, giving rise to late scarring and serious complications often requiring surgical treatment Herpes, chickenpox and smallpox also give rise to serious eye complications Skin ulceration and lymphatic gland involvement is characteristic of lymphogranuloma inguinale Pulmonary disease is characteristic of psittacosis *Yellow fever is a virus disease in which the abdominal viscera are* chiefly implicated The condition is manifested as a febrile disease in the nature *of a gastro-hepato nephritis Involvement* of each of the three systems indicated gives rise to the characteristic syndrome The gastritis causes hæmorrhagic vomiting, the liver inflammation causes jaundice and the renal congestion causes albuminuria The virus diseases are well described in textbooks on tropical medicine some of them with surgical implications are referred to elsewhere in this book

Virus diseases have been suspected for over a hundred years Some of them have been known as proved entities for the past fifty years The methods of isolating viruses are highly technical The procedure of colloidal filtration of suspected *material is a means of separating the virus from bacteria*, which are of a much greater size More recently inactivation of bacteria from specimens thought to contain viruses has been undertaken by the addition of ether, zephiran, sulpha drugs or antibiotics Any of these substances damage and kill off bacteria but have little or no influence on viruses Having isolated the virus free from live bacteria, its identification is undertaken by four principal methods Viruses being of very small dimensions in the level of 1 to 20 millimicrons can in some instances be seen by the electric ultramicroscope, making it possible to identify them *The ordinary*

edge so that, by rotation, a piece of marrow can be removed with ease It is used for investigation of several conditions requiring marrow biopsy

1 Normal marrow examination for control purposes
2 Protozoal infections, chronic malaria, kala-azar
3 Investigation of anæmias, leukæmias, thrombocythæmias
4 Neoplastic diseases and granulomata
5 Multiple myelomata
6 Bacterial septicæmias, such as brucellosis, etc

Treatment of leishmaniasis with antimony sodium tartrate has been largely abandoned as it gave poor results Trivalent antimony preparations therapeutically are not very effective the pentavalent antimony preparations are much more

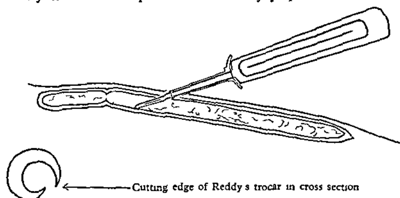


FIG 166

Diagram of Reddy s instrument for sternal puncture biopsy

soluble and effective in treatment Antimony sodium gluconate is less toxic and more effective than trivalent antimony preparations Lu and others,[21] working on mass campaign treatment of kala-azar in China, treated 5,000 cases with various preparations He favours the use of sodium antimony gluconate, which is pentavalent, and considers it the most efficient form of antimony in treatment Injections can be given intravenously or intramuscularly the latter is often convenient in young children who have small arm veins and who are at times a little restive when injections of any sort are used The doses suggested are 100 to 180 mg per kilo of body weight A cure rate of 95 per cent was reported Chung and others [22] used stilbamidine in cases where antimony preparations were not effective in certain cases They did not note any evidence of trigeminal neuropathy as reported elsewhere Lee and Ling [23] report the results obtained treating cases of leishmaniasis in China with pentamidine isothionate as being "excellent," giving 100 per cent cure in their large series of cases This drug is also very effective in treatment of African sleeping sickness

Manson-Bahr [24] considered that trivalent preparations of antimony were of little use in the treatment of cases of leishmaniasis, but pentavalent preparations of antimony gave good results Urea stibamine, pentostam and pentamidine

is the case with the Pasteur vaccine for rabies, the Salk vaccine for poliomyelitis and the Laigret vaccine for yellow fever

As rabies is a disease still seen in the tropics some comments on this condition from personal experience will be given A survey of recent developments is added as noted from the journals The most suitable methods of dealing with patients who are bitten by possibly infected animals is suggested Eight cases of human rabies have been seen personally On seeing the first case in 1937, *the likely diagnosis was initially thought to be tetanus* This is a very usual beginner's error A dose of antitetanic serum was therefore given The patient appeared to be having spasms about the muscles of the back In actual fact the patient when first seen was developing the early spasms affecting the inspiratory muscles The diaphragm is involved in these cases as well as the muscles about the throat As air enters the chest by spasmodic contracture of the diaphragm the impression is gained that the front of the chest is being raised, due to spasm of the back muscles, thus simulating early tetanus, but this was not the case As muscle inco-ordination became more marked and laryngeal spasms developed, the diagnosis was made by a male nurse who had previously seen cases of rabies At this time, four hours after the patient was initially seen, the inspiratory spasms were becoming so severe that a slight "barking" sound was being produced periodically with the spasms This alarming sound continued and became more audible throughout the whole night, the patient died next day This barking *sound is made by the larynx at the time the inspiratory muscles go into spasm* The diaphragm initially descends, drawing air into the chest, the larynx then closes, and as the inflow of air becomes obstructed suddenly a noise is produced comparable to that noted when a poor standard of anæsthesia is maintained and a patient goes into inspiratory spasm on handling of the abdominal viscera The final appearance of a patient with rabies when a laryngeal spasm is induced is very characteristic The patient looks "wild" and frequently tries to get out of bed, in a state of desperation Once this appearance is noted it is seldom forgotten A diagnosis of rabies can often subsequently be made immediately on seeing a patient After the spasm has passed off the patient is usually quite co-operative and mentally clear even though he is alarmed The ease with which laryngeal spasm can be induced by asking the patient to drink water is very remarkable and justly warrants the term "hydrophobia," or fear of water, as a name for the disease If the patient attempts to drink water, violent laryngeal spasms are produced The patient, not infrequently, pushes away the cup or receptacle containing water Even the sight of water induces the spasm It is sometimes stated that patients may bite like dogs, but this is not the case The patient, in fact, makes a rather inco-ordinate gripping *movement* at his throat [illegible] on and at the same time tends to flex [illegible] the mouth is closely approximated to [illegible] contaminated with *freely flowing and* often blood-stained saliva The patient dribbles saliva from the mouth because of his inability to swallow it The immediate mental impression is gained that an attempt to bite is being made By the time a patient comes to hospital with developed symptoms of rabies the animal bite, by which the infection was contracted, is usually soundly healed Only occasionally

optical microscope can detect only the appearance of the characteristic "inclusion bodies" in tissues Viruses are also identified by their pathogenicity for certain laboratory animals, some animals being killed by them when inoculated—this might be termed "biological selection"—while other animals are unaffected This technique is not unlike the identification of certain bacteria by their characteristic fermentation reactions produced in different sugar solutions It has been known for some years that if a virus is added to washed red blood cells a characteristic agglutination reaction takes place If, however, to the suspension of washed cells a known immune serum is added corresponding to a particular virus disease, this hæmoagglutination is interfered with If the patient's immune serum contains the antibody corresponding to the virus being tested, it can be recognised by the absence of hæmoagglutination and so the nature of the virus can be identified Known immune sera are kept for the purpose of virus testing at laboratories investigating these diseases As many of the viruses give rise to antibodies, complement fixation tests can be carried out for their identification In order to facilitate identification of viruses a method of concentrating virus has been introduced so that reactions are more obvious A small amount of the virus containing material is injected into the amniotic cavity of chick embryos which provides a suitable medium for its easy multiplication Hæmoagglutination reactions are greatly facilitated when concentrated virus obtained in this way is used

The spread of virus infections is by various methods Body secretions and excretions are probably a potent method of spread of viruses Blood itself may be infective and this constitutes a serious risk to laboratory workers Poliomyelitis is probably spread chiefly by alimentary infection with food ingested Food contamination is thought to be caused by flies Fresh-water swimming baths have been suspected as a source of transmission of this disease Certain insects and arthropod vectors are known to transmit some of the virus diseases

Sulphonamide drugs and antibiotics have generally proved ineffective or of limited use in treatment of most of the virus diseases Sulpha drugs and cholorom}cetin are both helpful, however, in radically changing the course of lymphogranuloma As viruses in most cases tend to give rise to a detectable immunity in serum, it would seem reasonable to give hyper-immune serum in treatment This, however, has met with only limited success in some cases

Rabies is a disease of a most serious nature It is due to a neurotropic virus transmitted by the bite of an infected dog in most cases After an incubation period of a variable time the patient develops an encephalitis affecting chiefly the tenth, eleventh and twelfth cranial nerve nuclei Interference with the function of these brain stem nerve centres causes first dysfunction and then paralysis of the mechanism of respiration and deglutition The patient dies within thirty hours of the onset of the clinical symptoms The use of hyperimmune serum has given very encouraging results in treatment of rabies Hyperimmune serum confers a passive immunity alone Many efforts have been made to produce active immunity in virus diseases by the inoculation of modified strains of particular viruses Such

the hand to the larynx position as though to push away something interfering with deglutition

Certain other conditions as well as hydrophobia may give rise to an altered mental state in a patient which might well be construed as an indication of early hydrophobia This occasionally occurs in the case of patients who are excited by smoking *Cannabis indica* or *Cannabis sativa* The patient develops a wild look, he acts in an inco-ordinate manner and is sometimes rather uncontrollable He, however, lacks the co-operation usually noted in cases of hydrophobia where the patients are very reasonable between the spasms The use of this drug is noted only occasionally It is much more common in some parts of the world than others

In some patients with African sleeping sickness who are being treated with tryparsamide there may be a sudden violent reaction in behaviour after they have received three or four injections of this drug At this stage, behaviour is sometimes exhibited which might initially suggest the possibility of the patient developing hydrophobia The fact that they are being treated for trypanosomiasis, however, usually suggests the nature of the abnormal behaviour which is well known A small number of cases have been seen where patients become excited rather suddenly, with a marked tendency to extend the neck forcibly at intervals, and act for a few minutes at a time in an inco-ordinated manner, rolling the eyes about In these cases it is sometimes found that there is a very heavy blood infection of microfilaria present A similar condition has also been noted in dogs where a heavy blood infection with microfilaria is associated with sudden but temporary attacks of peculiar behaviour not unlike developing rabies

Once clinical signs of hydrophobia develop in a patient it seems that a fatal result is inevitable in all cases Rabies infection in dogs was at one time comparatively common in Northern Europe but is now almost extinct It is still seen in Southern Europe, Spain, Italy, Greece and Yugoslavia, and the condition is endemic throughout Africa

Rollinson [25] mentions that the first case of rabies reported from Africa was noted at Port Elizabeth in 1893 Although the dog implicated had been imported from Europe, it is more probable that the infection was contracted locally Rabies is comparatively common in India, it occurs throughout Southern Asia and the condition is common also in Northern Persia

Christie,[26] reporting on 1,573 brain specimens sent to a laboratory in East Africa, notes the incidence of positive cases in various animals and human subjects

Subject	Positive Rabies	Subject	Positive Rabies
Dog	545	Civet cat	3
Jackal	54	Horse	3
Cow	31	Baboon	1
Sheep	10	Hyena	1
Cat	8	Donkey	1
Human	6	Pig	1
Badger	4		

does the patient or relative volunteer the information that a dog bite was sustained The condition is due less frequently to the bite of an animal other than a dog

Fig 167 shows a photograph of a child bitten on the face by a rabid dog The patient was given a course of antirabies vaccine but no clinical evidence of rabies developed Fig 168 shows another patient bitten by the same rabid dog, he was similarly treated and did not develop rabies The dog was proved to be rabid No hyperimmune serum was available for treatment in these cases Both patients were kept under observation for eighteen months and remained well during this time

In the last case, seen personally in 1957, the diagnosis of intestinal obstruction was suggested by a junior doctor who saw the case He had never previously



Fig 167



Fig 168

Fig 167—Child with facial bite of rabid dog
Fig 168—Adult patient bitten on face by same rabid dog

seen a case of rabies and did not suspect the condition The patient was in a maternity ward, advanced in pregnancy She was suffering from abnormal abdominal distension, hence the request for a surgical opinion It was quite obvious on seeing the patient that she was having very unusual head movements and she had the "wild" look about her eyes The diagnosis at this stage was very obvious On being tactfully asked if she had had a dog bite at any time in the past she immediately pulled off the bed clothes and pointed to the position of the head of the fibula, at the outer side of the right knee There was a healed wound of four months' duration Saliva came from the patient's mouth freely and laryngeal spasms were instantly induced by offering her water to drink The salivation in these cases is due probably to an inability to swallow the saliva rather than an excessive secretion being present To those who have had a bronchoscopy undertaken under local anæsthesia some temporary inability to swallow saliva is very apparent It is some hours following the examination before the normal sensation returns, with the wearing off of the local anæsthesia It is almost impossible to swallow saliva with an anæsthetised pharynx Movements are automatically made which resemble very closely those seen in patients with hydrophobia There is even a tendency to put the back of

working in the Philippine Islands, found it usual to encounter an incubation period of from two to six weeks in human subjects, but it was often longer This is a much shorter incubation period than usually noted in cases in Africa As opposed to this, it is important to note that the incubation period of hydrophobia in the dog is only three to seven days Under these circumstances it can be taken that if the animal lives for from seven to ten days following unusual behaviour, the condition is almost certainly not due to rabies Antirabies vaccine need not be given to patients bitten by such dogs

Whereas rabies is not a common disease it is a most important condition, in view of the high mortality rate—100 per cent in untreated cases The Bureau of Animal Husbandry reported 1,258 cases of death by rabies between 1946 and 1951 This figure no doubt represents only a fraction of the true mortality, as in vast areas of the tropical world there is still no registration of deaths

In view of the lethal nature of the developed disease the matter arises of the method of dealing with dog and other animal bites where the condition is suspected in the animal inflicting the bite Many dog bites are due to the irritability of female animals who are guarding their young If an early diagnosis can be made in a suspected rabid dog, it is of considerable value It is often not easy or safe to catch or control a rabid animal and so it is often killed as the best method of public safety in a community It is thus not possible to see if the dog dies itself of the disease within one week In these cases it is desirable to section the dog's brain as quickly as possible to see if Negri bodies can be found in the tissues of the central nervous system If rabies inclusion bodies are found, it indicates the absolute necessity of giving a course of antirabies vaccine to the patient bitten

Fryer[3] suggests a rapid method of obtaining a result of brain section from a dog within two hours The hippocampus area of the dog's brain is removed and the tissue is cut into small slices ⅛ in thick, these are placed in warm saline formalin at 60° C and ten minutes later they are dehydrated in warm absolute alcohol for ten minutes They are placed in a mixture of acetone and ether, equal parts, for a further ten minutes The tissue slice is then cleared in cedarwood oil at 60° C till clear It is then embedded in paraffin wax at 60° C, with two changes It is cooled, cut and stained Sections are mounted on albuminised slides and fixed with heat The wax is removed with changes of xylol, it is brought up through alcohol and water in that order and the slide is then stained for fifteen minutes with 1 per cent methylene blue and 1 per cent eosin The stain is heated before use After staining, it is treated with 40 per cent formalin and differentiated by alkaline alcohol—30 c c of alcohol and 8 drops of 1 per cent NaOH The sectior [illegible]
red [illegible]
finding [illegible]
till more precise methods can be employed

Khemani[33] has used the method of mouse brain inoculation in the diagnosis of rabies in India He has found that 30 per cent of dog brain specimens reported negative for Negri bodies were in fact positive, as shown by the mouse brain test In view of the gravity of the condition and the seriousness of an error in diagnosis, he is of the opinion that the mouse brain inoculation method of laboratory diagnosis

Rollinson[25] gives the following list of subjects infected with rabies in three different parts of Africa

Subject	Sudan 1923 53	Kenya 1909 52	Uganda 1921 56
Dog	714	86	79
Donkey	87		
Cattle	28	13	
Goat	23		
Cat	18	2	
Camel	11		
Horse	12	1	
Hyena	2		
Cheetah	1		
Monkey	1		
Jackal		62	3
Fox			3
Human	1	5	14

Ahuja,[27] working in India, noted the condition positive in dogs, jackals, wolves, an elephant, tiger, panther, mongoose, cat, camel, horse and mule No evidence of rabies was detected in mice, rats, squirrels or monkeys Patients treated as potentially infected at Kusuli, India, numbered 1,321

Fendall[28] recorded rabies in two patients following rat bite of the finger

Ahuja[27] noted the average incubation periods in rabies as being

Duration	Percentage
One month or less	33 0
In second or third month	49 0
In fourth, fifth and sixth month	13 0
Seventh month to one year	4 5
Over one year	0 5

Average incubation periods relative to bites at various sites were considered to be

Head and neck, fifty four days
Upper extremities, forty six days
Lower extremities, seventy-eight days

Under fifteen days incubation period is very exceptional Savage[9] reported a case with an incubation period of only thirteen days Taylor[30] noted a case in which a child died from rabies following an incubation of only eleven days This is the shortest incubation period noted in reported cases and is therefore an important record Rollinson[25] notes that the fox accounts for most cases of rabies in Canada The incubation in these cases is usually only about two weeks, this is much shorter than usually noted in tropical countries He suggests that the short incubation period may be accounted for by the difference in climatic conditions The average incubation period in human cases is about three months, the range of variation being from eleven days to one year approximately Martinez,[31]

is usual, but such is unfortunately not always the case If encephalomeningitis develops, the mortality is high Some cases develop unilateral and others bilateral facial paralysis The treatment suggested in these cases is intravenous fluids with the addition of 20 mg of ACTH This improves bladder function, which is disturbed, and makes the leg muscle pains less severe In the treatment of the developed condition of rabies it is suggested that the best sedative to give is largactil (chlorpromazine) (100 mg), repeated as frequently as necessary to keep the patient in a sedated condition The patient suffers from marked anxiety Hydrocortisone (80 mg) by injection eight-hourly and intravenous fluids are helpful Atropine by injection (1 in 100 gm) six-hourly makes the patient more comfortable On theoretical grounds it would seem that very large doses of hyperimmune antirabies serum might be given with advantage, but the general consensus of opinion is that once the symptoms appear, any form of treatment is only palliative Morphia has very little apparent effect

Having personally been given a course of antirabies vaccine in 1940 (with three laboratory assistants) we all felt markedly indisposed on the fifth, sixth and seventh days of the course of injections, but from the eighth day onwards the malaise passed off, the only discomfort then being the multiple injections During the three days of indisposition there was headache, slight temperature (99 4° F), pain in the lumbar region and a peculiar sense of restlessness The course of injections was continued with no ultimate adverse effects The symptoms produced appeared to be more than " incidental " The course of injections was ordered because a post-mortem examination was undertaken hurriedly, without using rubber gloves, on a suspected rabid dog The report returned from the laboratory after section of the brain was " positive " rabies

The processed fixed virus has two advantages it produces immunity quickly against street virus, as found in the dogs, and the risk of developing neuroparalytic accidents is small The incubation period of fixed virus or antirabies vaccine is probably only five to eight days Active immunity is developed much before the time that street virus is likely to produce its adverse effects As the incubation period of street virus in the dog is only about one week, it is usually quite safe to observe the dog in quarantine up to one week before starting antirabies injections Within this time the dog will almost certainly die or show active signs of early rabies if the disease is present If the dog dies, antirabies vaccine can be given and the immunity is developed within seven to ten days so that this is still within the time of the incubation of virulent street virus in the human subject As antirabies vaccine or fixed virus is a live virus, it is considered advisable to give the person being injected a dose of hyperimmune serum as well as the antirabies vaccine This hyperimmune serum confers a " passive immunity " on the person receiving it and is not in itself dangerous

With the large number of cases of rabies being noted in North Persia, much experimental work on rabies has been undertaken at Tehran under the auspices of the World Health Organisation In 1954 an excellent opportunity was afforded of trying out different techniques of treatment, as twenty-nine persons were bitten and presumably infected on the same day by a single rabid wolf in a mountain village These cases were transferred to Tehran between eighteen and a hundred

should replace dog brain section alone, or should certainly be used in all cases where the dog brain sections are negative

With this refinement in diagnosis, it has become obvious that rabies is much more common in India than previously believed The necessity of quarantining suspect dogs, if they can be caught, is obvious In country stations where an outbreak of rabies occurs, it is highly desirable to destroy all stray dogs that are uncared for For the benefit of those who may have to deal with such a situation, it can be said from personal experience that such a measure is welcomed and seldom resented by the local residents There is seldom any opposition, but it should be undertaken only after consultation with the administrative authorities Stray dogs are a public nuisance and a communal danger, being a source of infectious diseases In Yugoslavia, where rabies is an endemic disease, Kovac [34] considers that the best method of controlling the disease is mass vaccination of all dogs

The method of dealing with patients who are bitten by suspect rabid dogs is important because of the lethal nature of the developed disease Local disinfecting or even cautery of a rabid animal bite does not prevent rabies It must be remembered that if an antirabies vaccine is given, a method of treatment is being used which is in itself not devoid of danger In explanation of this it should be noted that the modified antirabies virus which is used in vaccination is still a living virus entity with serious potentialities

The term "street virus" is used for the naturally occurring virus in rabid animals "fixed virus" is street virus which has been modified by passage through several successive animals This laboratory procedure shortens the incubation period of the virus and attenuates its virulence to a low level in most instances This modified virus has the beneficial effect of conferring an active immunity when injected into a person This induced active immunity protects against the lethal effect of street virus The heroic work of Pasteur, against enormous opposition, has ultimately resulted in the development of a strain of virus which is comparatively safe

Antirabies vaccine or fixed virus may, on occasions, unfortunately, produce neuroparalytic accidents Some fatalities have been reported following its use To give an antirabies vaccine indiscriminately on a slender pretext is most unwise Martinez,[31] commenting on neuroparalytic accidents in the Philippine Islands, considered the risk to be in the level of 1 in 2,500 to 1 in 5,814 patients treated He was of the opinion that vaccine should not be given in cases where the skin was not damaged McFadzean and Chao [35] put the risk of neuroparalytic accidents as high as 1 in 831 cases treated with an antirabies vaccine In a large town in West Africa many patients were given antirabies vaccine during a rabies "scare" There were four neuroparalytic cases following treatment Two of the patients died and two recovered slowly If neuroparalytic accidents do occur, 25 per cent become apparent usually within ten days of the injections being started, 62 per cent during the third week and 13 per cent after the fourth week according to McFadzean He considers the risk is past after the fiftieth day

The symptoms produced in neuroparalytic cases are fever, rigors, backache, headache, general body pains, nausea, vomiting and finally nerve weakness, which comes on one to three days after the initial constitutional upset Complete recovery

Boulger and Cannon,[38] working at Yaba in Nigeria, consider that the optimum temperature for storage of antirabies vaccine is from 2° to 5° C At this temperature they consider that it remains potent for six months, after this time it deteriorates If stored at below freezing point, minus 4° to 0° C, it loses its potency in one month If kept at room temperature in West Africa (84° F *or* 28 8° C) *it* deteriorates within one month The optimum temperature for storage is considered to be 5° C As this is a little above freezing point it is thought wise to use an ice-box *rather than a refrigerator*

The question is sometimes asked, "How long does the immunity conferred by a course of antirabies vaccine last?" An opinion is expressed on this point by the Editor[39] of the *Journal of the American Medical Association*, he states that following a fourteen-day course of antirabies vaccine, immunity is produced for five years, while if a booster course is given at the end of a five-year period the immunity lasts for fifteen years

A variant of rabies virus of much interest is that contracted by bat bites in the Caribbean area of the world Nehaul[40] notes that the first case of bat rabies was reported in Trinidad in 1925 Between 1925 and 1953 a total of eighty-nine cases termed "paralytic rabies" were noted The term "paralytic rabies" was applied because of the leg weakness noted, which was a prominent symptom Dysphagia was present only at the terminal stage of the disease The symptoms are more like those seen in neuroparalytic accidents of fixed virus vaccination, *where leg weakness is a dominant feature and laryngeal dysphagia is not prominent* Negri bodies were found in the brains of deceased patients who suffered from bat rabies The same brain inclusion bodies were also detected in some of the bats investigated The history of a bat bite was elicited in many of the cases In the original description it is observed that the labourers who were first noted with the disease slept in the open in hammocks They were not in all cases aware of what exactly bit them In many of the cases they were, however, aware of the bite having been inflicted by a bat Some days after the initial bite the patients felt "pins and needles" in the leg and then paralysis set in Dysphagia was a very late symptom The body temperature in these cases was higher (103° F or 39 3° C) than in patients suffering from dog rabies, in the latter type the temperature is usually only 99 F° or 37 3° C Similar cases of bat rabies were reported in 1953 from British Guiana, nine cases being noted within a few weeks In Sinaloa and the Jalisco areas of Mexico bats are known to attack persons viciously

The incubation period of bat rabies is a matter of a few days to a few weeks' maximum The bats thought to be causative of this condition are said to be of the vampire type. Vampire bats do not occur in Africa though there are many other sorts in enormous numbers In view of the similarity between bat rabies and canine rabies it is presumed that a cross immunity might well exist and benefit be derived in both types from the use of fixed virus vaccine injections Hyperimmune serum followed by a course of antirabies vaccine should therefore be used The likelihood of detecting rabies in bats is much less than in dogs, as with flying animals the opportunities of catching the bats are remote Dead bats could be investigated to see if inclusion bodies are present in the brain

hours of being bitten. Baltazard and Bahmanyar[36] divided these cases into six groups in order to test the efficiency of various methods of treatment The biting wolf was subsequently proved positive by microscopic examination of brain sections Negri bodies were found in the brain

The regime of treatment and results were as follows

Group	Number of Patients	Infection	Hyperimmune Serum Injection	Antirabies Vaccine Injection	Result
I	5	Head bites	2 of 20 c c	21	No deaths
II	7	Head bites	1 of 40 c c	21	One death
III	5	Head bites	6 of 40 c c		Three deaths
IV	1	Brain lacerations	6 of 40 c c	21	Recovered
V	6	Arm wounds only		21	Recovered
VI	5	Limb wounds only	Serum only given		Recovered

The results correspond closely to those obtained at the Pasteur Institute during the past fifteen years 40 per cent deaths in treated cases with head wounds, 2 per cent deaths in treated cases with limb wounds Hyperimmune serum reduces death to one in seven cases or 14 per cent No deaths occurred where two injections of hyperimmune serum were given The World Health Organisation recommends that if a patient is bitten by an animal which is suspected of being rabid, the animal be tied up for one week in quarantine and the patient be immediately given an injection of hyperimmune serum If the animal does not die within seven days it is almost certainly not rabid The patient is then considered safe without any further treatment If the animal dies, the patient has already received preliminary treatment and should then be given the full course of antirabies vaccine Serum produces an immediate passive immunity Antirabies vaccine produces an active immunity of increasing titre during the next few weeks The advantage of fixed virus is the rapid rate at which the immunity is produced by it and its comparative safety from complications

In order to ensure that the antirabies vaccine used for therapeutic purposes remains active, it is important to know the optimum condition under which it should be stored Dogra,[37] working in Bombay, India, observed that antirabies vaccine which is prepared in carbolised suspension should be kept at an optimum temperature of 5° to 8° C. Between these limits which is only a little above freezing point, it remains potent for eight to twelve months, it then deteriorates rapidly If stored at room temperature in Bombay it becomes quite useless in two months New vaccine, properly stored, increases in potency somewhat during the first two months It is recommended that the vaccine should therefore be kept for two months before being marketed Dogra noted that rabbit brain vaccine prepared by the "freeze drying" method and sealed in ampoules remains potent for twelve to twenty-four months if kept at low temperature Mouse brain vaccine prepared under the same conditions and appropriately stored retained its potency for a much shorter time than when rabbit brain was used Rabbit brain products are therefore considered most efficient for treatment

Many bacteria can be identified after adequate staining and microscopy Others require additional techniques for their identification—morphological characters of growth, sugar fermentation reactions and biological effects in laboratory animals all being important Tetanus is a very characteristic clinical condition It is due to the neurotoxic effect of the tetanus bacillus The organism is drumstick shape in character It can easily be recognised following its isolation The terminal head is due to the presence of a spore

The importance of tetanus as a clinical entity is due largely to its high mortality rate In the absence of adequate treatment, tetanus has a mortality of over 80 per cent Tetanus spores are extremely resistant to heat, drying, chemicals and exposure to sunlight, they therefore remain a constant danger if material containing them contaminates wounds following violent accidents or surgical wounds Tetanus bacilli can usually be found easily in soil, it is therefore commonly noted following agricultural and road accidents Following wounds sustained in road accidents, 1,000 units of antitetanic serum should be given as a routine prophylactic dose The distribution of tetanus cases is far from uniform Many cases occur in some districts while there are few in others Following entry of tetanus bacilli into a wound of any form there is a time interval or incubation period, usually of from five days to five months, before the onset of clinical symptoms This time interval may on rare occasions be longer The patients initially feel malaise, some restlessness and low fever There is then usually onset of severe pain and spasm of the muscles of the back, of the chest and lumbar areas Difficulty is later encountered in opening the mouth, hence the term lockjaw The spasms of back muscles increase in severity and frequency they are in some cases of sufficient severity to raise the patient off the bed so that he becomes supported on his shoulders and his heels If the incubation period is short the severity of the attack is usually very marked

Croot,[41] indicating the improvement in prognosis following the new methods of treatment, gives the following figures

1 In Franco-Prussian War, 1870-71, dressings and sedatives only used Mortality rate, 11 per 1,000 wounded died of tetanus
2 In World War I, 1914-18, dressings, sedatives and antitetanic serum used Mortality rate, 8 per 1,000 wounded, later 1 per 1,000 wounded died of tetanus
3 In World War II, 1939-45, prophylactic tetanus toxoid, antitetanic serum and penicillin used Mortality rate, 0 43 per 1,000 wounded died of tetanus

The prophylactic use of tetanus toxoid is a spectacular advance in management of this serious condition Antitetanic serum is useful in treatment of developed cases Penicillin has also a marked effect on tetanus bacilli themselves

Slome,[42] considering tetanus in South Africa, compared the mortality incidence with that noted in England and observed

Tetanus deaths in South Africa during 1946-48	563 cases
Tetanus deaths in England during 1946-48	203 cases

Rabies can be simulated to some extent by eel poisoning Two to five hours after eating the meat of the eel, *Gynothorax flavimarginatus*, there is a tingling sensation developed about the mouth and throat, the legs become weak and ataxic, there is excess salivation and swallowing is difficult, convulsions and coma may develop The patients are much helped by the use of intravenous calcium in addition to saline glucose, all of which also give some temporary relief in rabies cases

BACTERIAL CONDITIONS

Tetanus

Of the enormous number of diseases due to bacterial infections there are some of special importance to those undertaking surgical work in the tropics Several bacterial diseases originally widespread throughout the world are now

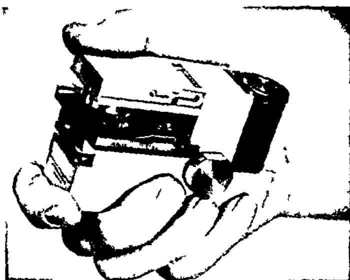


Fig 169
McArthur travelling microscope
By kind permission of Dr John McArthur

practically limited to tropical areas Bacteria ranging from between 1 and 10 microns are of sufficient size to be seen easily when stained, using the ordinary optical microscope The standard microscope is much too cumbersome to be carried about on trek with any ease A much more convenient instrument is the McArthur microscope (Fig 169), which is quite revolutionary in design It is a high powered microscope suitable for research and general purpose work In spite of its small size, which approximates that of a miniature (35 mm) camera, it embodies all the advantages of the standard microscope and is neat and compact in design, being only 4 by 2½ by 2 in in external measurement It weighs 18 oz and is manufactured by Cook, Troughton & Simms Ltd , York, England A good microscope is essential for accurate diagnosis in certain tropical diseases

thought to be due to minor burns associated with the festivities of the celebration where fireworks are commonly used

Tetanus is somewhat more common in deep puncture wounds, particularly round joints, than following superficial wounds Tetanus germs, being anaerobic in character, flourish best in deeply embedded tissues Stick wounds—where an old piece of rotten wood breaks off in the tissues—are particularly dangerous and liable to develop tetanus

Considering puncture wounds, an *interesting point arises as to whether* antitetanic serum should be given to patients who have sustained dog bites The gravest risk of dog bites in the tropics is rabies, but one might suspect tetanus as a *further potential danger* This matter has been considered by Nikolic,[46] who noted that in Yugoslavia there were 700,000 dog bites reported in hospitals in that country in twenty-four years There were no cases of tetanus noted as a result of the bites This is very remarkable, but the information is of importance It seems that dog bites *per se* do not predispose to tetanus infection There is, however, a small risk of tetanus associated with any type of wound Stitt[47] notes that there is a high incidence of tetanus following the bites of sting-ray fish in bathers Following bee stings, patients may suffer anaphylactic shock of varying degrees, some mild, some severe, in non-fatal cases, however, it is noted that many of the patients suffer from a marked degree of trismus or difficulty in opening the mouth, very comparable to mild tetanus, for twenty-four or forty-eight hours This is a recognised complication of bee stings Temporary tetany resembling tetanus may occur following radical thyroid operations, but invariably improves by itself—it is relieved by intravenous or intramuscular calcium injections It is *alarming to the patient, but seldom very dangerous The nature of the operation* suggests the cause of the condition

The severity of an attack of tetanus is judged by the frequency and tenseness of the muscle spasms noted *A form of tetanus personally noted on many occasions,* which is not mentioned in textbooks, is that which for convenience is termed the " thoracic " type It comes on slowly with a marked sense of constriction about the chest There is general hypertonicity of both the abdominal and back muscles Some of these patients have been sent into hospital with a diagnosis of " acute abdomen " because of the board-like rigidity of the abdomen It is, however, unlike an acute abdominal condition in that the rigidity is present for many days and does not follow chronic gastric symptoms In this type there is little or no tightness of the jaw muscles, there is no apparent surface wound or history of past injury which might account for the condition, the source of the infection is certainly not obvious, the onset of the rigidity is gradual and passes off slowly, finally leaving a very marked risus sardonicus type of facial appearance The type seems to be of low virulence as the mortality is not high Some cases are brought to hospital obviously recovering when first seen even in the absence of treatment The cases seen were all young adult patients The terminal tightness of the jaw and the final facial appearance and rigidity of the back muscles are sufficient to justify calling it tetanus Spasms of the back muscles do occur but *are not very conspicuous* Clinically, this low-grade type of tetanus closely resembles the otogenic tetanus as described by Shah[48] The thoracic type may have been

Considering the much greater population in England than in South Africa it would seem that the rate of tetanus cases in South Africa is at least ten times that seen in England In areas of the world where there is a high incidence of tetanus, the use of mass vaccination with tetanus toxoid is advocated This is particularly the case in industrial agricultural enterprises in the tropics

Stephens,[43] working in West Africa in 1931, investigated samples of dust from outside and inside an operating theatre The bacteriologist reported "We have got an abundant growth of tetanus bacilli from the mound outside the theatre, we had no difficulty in finding tetanus bacilli in material from the sites named" A very high incidence of tetanus was noted by Thomas[44] from another district in Nigeria and it is reported that it was responsible for more deaths than any other single condition (1956) Some cases were mild, others were fulminating in type

In view of the ease with which tetanus bacilli can be recovered from cracks in theatre floors in some parts of Africa, it is advocated that all new theatre floors should be laid in one undivided piece of concrete or turesco Multiple section, so popular with builders, should not be used They like divisions so that cracks, when they start, do not spread so easily They do not appreciate that divisions between sections or tiles are a source of potential danger The most practical method of eradicating tetanus spores from cracks and divisions already existing in stone floors is to flame the cracks with an artisan's blow-lamp Washing and application of disinfectants is inadequate

Following the occurrence of several cases of tetanus in surgical wounds in a large centre in West Africa, we investigated the conditions in our own theatres at Kumasi in Ghana Many specimens were examined from floors, ledges and containers, but no specimens were found to contain any tetanus bacilli However, we considered it advisable to make this investigation in view of the findings elsewhere It was decided to have two theatre floors completely replaced as they had been originally made in coloured turesco patterns With wear and tear they were now developing widening gaps between the various sections, particularly in the centre of the theatres where they were frequently soiled by infective material Fæcal contamination is one source of tetanus infection The incidence of tetanus bacilli in human fæces varies greatly in different places as noted in different centres by eminent bacteriologists The figures vary from 0 to 60 per cent

My colleague Dr F C Harris cultured 160 routine laboratory specimens of human fæces for tetanus bacilli, but all were found to be negative

Few parts of the tropics have yet highly mechanised agricultural facilities, but mechanisation is liable to increase rapidly in the future This predisposes to many mechanical accidents to hands and an increased incidence of tetanus In the U S S R, following the introduction of mechanical harvesting after the war (1945), there has been a very marked rise in the incidence of tetanus This is thought to be due to the increased incidence of hand accidents (Matviev[45])

There is a high risk of tetanus following burns Fig 136 shows the abdomen of a child where a burn was inflicted in native treatment of an enlarged spleen The child developed tetanus three weeks later The patient recovered following treatment, but was very ill for some weeks In the U S.A there is an annual rise in incidence of tetanus following American Independence Day, 4th July This is

It is extremely difficult to clean the hard thick skin about the feet of patients who constantly walk barefooted

The type of tetanus which gives rise to great concern to all doctors working in the tropics, because it is so frequently seen and so lethal in its effects, is tetanus neonatorum It is a great tragedy for a woman to go through the vexations of pregnancy and labour and, *having been successfully delivered of a live child*, to lose it one week later Yung,[53] working in China, noted the incidence of tetanus neonatorum in hospital practice to be 0 053 per cent of deliveries, while in unqualified midwifery the incidence was 11 69 per cent The finding in West Africa prior to the introduction of the Midwives Ordinance was very similar to this Certain unqualified midwives had a very much higher incidence of tetanus neonatorum occurring in their cases than had others The regime of treatment *suggested by Yung in 1949* gave good results at a time when few others were achieving comparable results in this condition He recommended 10,000 units of penicillin three-hourly for two weeks and 10,000 units of antitetanic serum daily for one week Various sedatives were tried in appropriate doses seconal, curare in oil, etc , tribromethal per rectum was also tried The infant was fed by an indwelling nasal catheter Six cases of recovery are reported (Yung [53]) It is noted that there was a marked fall in the incidence of tetanus neonatorum in Shanghai when application of tincture of iodine to the umbilical cord stump was adopted as a routine measure Iodine and hydrogen peroxide both kill tetanus spores within two hours (Mackie and McCartney [54])

Doctors who saw tetanus neonatorum in the tropics prior to the introduction of penicillin considered that infantile tetanus was invariably fatal, irrespective of the giving of antitetanic serum With the introduction of penicillin the position has been radically changed Penicillin has a very marked effect on tetanus bacilli, in spite of the statements of some writers to the contrary Gelfand [55] noted a 30 per cent recovery rate in tetanus neonatorum cases following treatment with 40,000 units antitetanic serum ... and
25 mg chlorpromazine twice
water for slower absorption
results five recoveries in eleven cases so treated The dosages were slightly modified as 60,000 units antitetanic serum daily till the child starts to suck the breast again, 250,000 units penicillin twice *daily* and 35 mg *chlorpromazine* twice daily till spasms stop Spoon feeding is adopted till sucking recommences One of the first indications of tetanus neonatorum starting in infants is that they decline to suck on about the fourth day By the fifth day, muscle spasms become apparent

Earle and Mellon [57] treated a series of thirty two cases of tetanus neonatorum in Costa Rica in 1958 with excellent results Only eight of the patients died, while twenty four recovered *The regime of treatment recommended* was

1 Intramuscular barbiturates, 32 mg sodium phenobarbital
2 Chlorpromazine, 1 mg per kilo of body weight four-hourly for four to six days
3 Antitetanic serum, 30,000 units injected round the umbilical stump

of otogenic origin, but no ear discharge was noted or complained of In fact, an ear discharge was not particularly looked for

Shah collected a large series of cases of tetanus and compared them with series from other districts, noting the proportion thought to be of otogenic origin

Author	Total Tetanus	Otogenic Tetanus	Per cent Otogenic
Sahiar	319	44	13 7
Kholsa	88	4	4 5
Shah	158	30	18·9

This clinical type does not figure prominently in American or English publications In the cases noted by Shah the patients were most frequently children Ear discharges are much more common in children than adults in the tropics The mortality of non-otogenic tetanus was 48 4 per cent, while in the otogenic type the mortality was much lower—26 6 per cent These cases indicate the necessity of ear examination in tetanus cases In very wet districts in the tropics ear discharges are very commonly seen, while in districts with a low humidity they are less common

Whereas tetanus has not been noted personally following perineal laceration in childbirth, Dave [49] noted it in many cases He compares three series of cases where the methods of treatment differed, the resulting mortalities are given

Treatment	Mortality
Antitetanic serum plus sedatives alone	75 per cent
Antitetanic serum plus sedatives plus penicillin	62 per cent
Antitetanic serum plus sedatives plus penicillin plus cortisone	25 per cent

The additional use of cortisone in combination with the other well established methods of treatment is noteworthy The practice of giving pregnant women tetanus toxoid to immunise them before delivery is advisable in districts where tetanus is very common Vervoorn [50] used tetanus toxoid in a district in West Africa where tetanus is seen frequently He mentions that one infant born of an immunised mother recovered from tetanus neonatorum, it was treated by antitetanic serum alone It is suggested that the tetanus toxoid given to the mother late in pregnancy probably conferred a fair degree of immunity on the infant before birth

Patients suffering from tetanus need particularly careful nursing attention A special nurse is necessary if good results are to be obtained Kirkpatrick and others,[51] commenting on the treatment of severe cases of tetanus by the use of positive pressure oxygen in combination with sedatives, muscle relaxants and penicillin, considered tracheotomy desirable in cases where respiration was very depressed and oxygenation difficult Antitetanic serum and penicillin were also used In patients who do not normally wear shoes it is advisable to give antitetanic serum and penicillin following operations carried out below the ankle position

5 The use of intravenous fluids or fluids per rectum is also essential
6 Intravenous calcium gluconate twice daily decreases severity of the spasms
7 The use of oxygen to assist respiration is also beneficial

The dose of each of the drugs is regulated according to the severity of the case and the body weight of the patient, whether he be an infant, small child, adolescent or adult

Anthrax

Anthrax is a clinical condition which is still seen from time to time in outbreaks in the tropics, it is now rare in Europe Malignant pustule is the type most commonly seen Anthrax also manifests itself as a pulmonary condition, termed woolsorters' disease, due to inhalation of anthrax spores into the lungs This follows the sorting of wool and fur products which is associated with cleaning of animal hair In some instances there is infection about the mouth and upper respiratory passages The larynx becomes involved, giving rise to a condition not unlike diphtheria with respiratory embarrassment Kerr [59] noted some cases of this sort in East Africa in 1944 If the anthrax is not treated in the early stages a septicæmic form develops The causative anthrax bacillus is very characteristic in appearance It is 4 to 8 microns in length, has a firm capsule and is rectangular in shape It occurs in short chains, in pairs, or singly The bacilli, when taken from human cases direct, do not show any spores, as opposed to the appearance noted in bacilli taken from infected animals which show centrally placed spores Spores are also noted on culture of the bacillus The bacillus is Gram positive on staining Special stains must be used to demonstrate the spores The Ziehl Neelsen technique can be used following staining and washing, 5 per cent sodium sulphite solution is applied to the slide for thirty seconds, then rewashed and counter stained with 1 per cent aqueous methylene blue for one minute This method shows the spores very well

If anthrax bacilli cannot be found easily in discharges from a suspected lesion, a small quantity of the discharge should be taken and injected subcutaneously into a mouse or guinea pig Both of these laboratory animals are very susceptible to anthrax, and die within two days of the infecting injection Large numbers of anthrax bacilli can usually be found in the local lesion following the injection They can also be found in heart blood and spleen material from the dead animals

The most commonly seen type of human anthrax lesion is malignant pustule Personally, this type only has been recognised Several cases have been seen and the lesion has been on the face, or less commonly on the hand It is thought that the hands are almost certainly first contaminated and the forehead is secondarily infected by passing an infected hand across the forehead while rubbing away perspiration

Mavros [60] noted an outbreak of cutaneous anthrax in the Lundi Native Reserve in South East Africa Twenty five cases of anthrax were observed and treated The distribution of the lesions was as follows

Face—11 Hand—5 Trunk—3 Head, other parts—2 Shoulder—2 Thigh—2

4 Antitetanic serum, 10,000 units daily in addition—total 100,000 units
5 Penicillin, 500,000 units daily for five days—total 2½ million units
6 Clean the umbilical stump with H_2O_2
7 Intravenous fluids for four days, no food till the fifth day

In view of the difficulty of getting tiny children with tetanus neonatorum to take fluids or breast milk by mouth (which is one of the characteristic symptoms of their condition), it has always been found satisfactory personally to extract the mother's breast milk and give it with fluid per rectum very slowly If not given too fast it is absorbed and not expelled Nurses in country stations sometimes complain that they do not have a breast pump to extract the milk To get over this difficulty it is usually easy to get a clean new tobacco pipe from a local shop and, after sterilising it, connect the mouth end to a rubber tube which enters a suction bottle To the other connection in the stopper of the bottle a further rubber tube is connected through which suction can be applied The bowl of the pipe fits comfortably over the mother's nipple and, as suction is applied, milk is withdrawn easily

Lewis,[68] working in India, dealing with adult patients suffering from tetanus, used the following method of treatment with spectacular success

1 Antitetanic serum, 120,000 units daily for eight days
2 Penicillin daily
3 Intramuscular paraldehyde
4 ACTH, 25 mg in 2 litres 5 per cent glucose saline daily

Cases so treated did better than a control series where no ACTH was used The results were as follows

Cases	Type	Deaths	Recovery	ACTH
43	Mild	7	36	Not given
10	Severe	7	3	Not given
10	Severe	4	6	Given

Following the use of corticotropin there were fewer spasms and the temperature fell to a lower level The death-rate was also lowered ACTH confers a marked advantage on the patients It is not always easy to compare tetanus cases, as the severity of the disease varies considerably and the stage at which the patient starts treatment is important Some cases are brought to hospital in a very poor condition There seems little doubt that the best method of treatment to use in tetanus cases is

1 Antitetanic serum to counteract the neurotoxins
2 Chlorpromazine as a muscle relaxant and as a central sedative
3 Penicillin in large doses to kill the causative bacteria
4 Cortisone or allied suprarenal preparation as a stimulant and regulator of the blood sodium potassium balance

of anthrax varies greatly in different cases Some cases are mild, others are fulminating Without treatment 25 to 50 per cent of cases of malignant pustule die With pulmonary and septicæmic infections the mortality is wellnigh 100 per cent without treatment The use of antianthrax serum has been employed but it is of limited value In all cases seen personally, novarsenobenzol has been given (0 45 gm) soon after the case was seen and 0 6 gm four days later for an adult Two injections were sufficient to clear up the infection Novarsenobenzol is quite specific in treatment and gives excellent results These cases were seen and treated in the years before penicillin became freely available Novarsenobenzol is still available in most country stations even if penicillin is not, as it is still freely used for spirochætal infections Penicillin and the tetracycline drugs can be given by mouth and are equally advantageous, they have the advantage of saving the patient the discomfort of repeated injections Animal protection is afforded by mass vaccination of herds in infected areas, using Pasteur's vaccine made from attenuated strains of anthrax bacilli specially prepared for this purpose

Diphtheria

Failure to recognise any serious disease at an early stage because of the infrequency of its occurrence adds greatly to its danger The popular conception that diphtheria does not occur in warm climates is incorrect It is true that it occurs more commonly in climates of a mean average temperature of below 60° F than above this figure, but it does occur in tropical climates on occasions Infection with diphtheria bacilli gives rise to inflammatory areas on wet surfaces of the body The nose and throat and the larynx are most frequently affected The vagina may be involved with diphtheria in female patients, particularly in children Infection of the conjunctival sac has been reported Superficial ulcers of any part of the body may be found to contain diphtheroid bacilli Surgical wounds are, on very rare occasions, infected with diphtheria

Surface ulcerations due to diphtheroid bacilli are termed veldt sores Fig 170 shows a small ulcer on the leg of an African patient who was treated in the northern territories of West Africa The patient was a young man who complained of a painful sore of some [illegible] of marked lassitude He was suffering fro[illegible] the leg ulcer The [illegible] to have a fibrino pur[illegible] slightly thicker at one end than the other The size is from 3 to 4 microns in length They do not form spores, and they have a characteristic appearance when stained with Neisser's stain

The tendency to develop peripheral neuritis as a result of absorption of diphtheritic toxin is characteristic of the infection It becomes apparent in cases which are not recognised at an early stage and so remain untreated One European patient seen in West Africa suffered from a chronic sore above the outer side of the right ankle of two months' duration, treatment met with very limited success She lived many miles from hospital and declined admission to hospital During her second visit to hospital she complained quite incidentally that recently she

The cases were treated with 300,000 units of penicillin twice daily Local applications of iodiform powder were also used There were no deaths The organism was hard to demonstrate The lesions showed a central black necrotic area, there were surrounding vesicles and massive local œdema

In all the cases seen personally the patients were admitted in a febrile condition but not looking particularly ill There was an acutely inflamed localised area, usually about the forehead, which looked remarkably like an uncovered smallpox vaccination reaction of six or seven days' duration There was a central grey necrotic area with surrounding water blisters, some of these had already burst and were running water freely down the forehead The central slough was not black, as usually described in these cases, but grey The watery discharge was quite clear In some instances the lesion looked like a second degree burn with vesication, the local blisters being quite large around a small irregular area as though touched by a piece of hot metal At the early stage of an anthrax pustule the appearance closely simulates the inflamed area seen in cases of myiasis In most cases in the tropics there is a history of the patient having handled meat from the carcass of a dead animal

Browne, Holden and Hutchinson [61] noted a number of cases of anthrax in a village near Lawra in North-West Ghana, eleven cases were treated, two had died before the doctor arrived and another was moribund The distribution of the lesions was as follows

Chest—10 Head—8 Arms—3 Legs—3

Total pustules was twenty-four on thirteen patients, some having as many as four distributed at various sites

The cases were treated with 0 6 gm intravenous neoarsphenamine, given on alternate days for three doses Of ten patients treated, nine recovered and one died The patients had carried the infected meat on their backs In such instances the smell of decomposing meat carried long distances in the heat of the tropics attracts a large number of flies Flies of the *Stomoxys* type may carry anthrax bacilli about the proboscis mechanically, and on subsequently biting a person infect that individual with anthrax at the site of the bite Raper [62] notes an outbreak of malignant pustule cases in East Africa Some of the patients developed an anthrax meningo-encephalitis

Carmichael [63] reported an instance where 300 Africans ate the meat of the infected carcass of a hippopotamus Eleven of the people died from anthrax as a result of infections contracted from the meat Whereas cattle and sheep are the most commonly infected animals, many other types also become infected There is a high risk of contracting anthrax following eating of the meat of animals which die of this infective disease In some instances an infected animal is dug up and eaten in spite of warnings of the danger of infection If the death of an animal is suspected as being due to anthrax infection it can be proved most easily by examination of heart blood or material aspirated from the spleen Material from either site usually contains anthrax bacilli in large numbers Spores can be seen in stained specimens from animals Woolsorters' disease or acute pneumonitis due to the inhalation of anthrax spores has not been seen personally The virulence

of anthrax varies greatly in different cases Some cases are mild, others are fulminating Without treatment 25 to 50 per cent of cases of malignant pustule die With pulmonary and septicæmic infections the mortality is wellnigh 100 per cent without treatment The use of antianthrax serum has been employed but it is of limited value In all cases seen personally, novarsenobenzol has been given (0 45 gm) soon after the case was seen and 0 6 gm four days later for an adult Two injections were sufficient to clear up the infection Novarsenobenzol is quite specific in treatment and gives excellent results These cases were seen and treated in the years before penicillin became freely available Novarsenobenzol is still available in most country stations even if penicillin is not, as it is still freely used for spirochætal infections Penicillin and the tetracycline drugs can be given by mouth and are equally advantageous, they have the advantage of saving the patient the discomfort of repeated injections Animal protection is afforded by mass vaccination of herds in infected areas, using Pasteur's vaccine made from attenuated strains of anthrax bacilli specially prepared for this purpose

Diphtheria

Failure to recognise any serious disease at an early stage because of the infrequency of its occurrence adds greatly to its danger The popular conception that diphtheria does not occur in warm climates is incorrect It is true that it occurs more commonly in climates of a mean average temperature of below 60° F than above this figure, but it does occur in tropical climates on occasions Infection with diphtheria bacilli gives rise to inflammatory areas on wet surfaces of the body The nose and throat and the larynx are most frequently affected The vagina may be involved with diphtheria in female patients, particularly in children Infection of the conjunctival sac has been reported Superficial ulcers of any part of the body may be found to contain diphtheroid bacilli Surgical wounds are, on very rare occasions, infected with diphtheria

Surface ulcerations due to diphtheroid bacilli are termed veldt sores Fig 170 shows a small ulcer on the leg of an African patient who was treated in the northern territories of West Africa The patient was a young man who complained of a painful sore of some months' duration and a constant feeling of marked lassitude He was suffering from peripheral neuritis secondary to a diphtheritic infection in the leg ulcer The inflammation associated with diphtheria is commonly noted to have a fibrino-purulent exudate Diphtheria bacilli are Gram-positive, and are slightly thicker at one end than the other The size is from 3 to 4 microns in length They do not form spores, and they have a characteristic appearance when stained with Neisser's stain

The tendency to develop peripheral neuritis as a result of absorption of diphtheritic toxin is characteristic of the infection It becomes apparent in cases which are not recognised at an early stage and so remain untreated One European patient seen in West Africa suffered from a chronic sore above the outer side of the right ankle of two months' duration, treatment met with very limited success She lived many miles from hospital and declined admission to hospital During her second visit to hospital she complained quite incidentally that recently she

had noticed that on drinking tea there was a tendency for the tea to go into her nose and come out through the nostrils on attempting to swallow it. This was the first indication of peripheral neuritis, or paresis of the soft palate, which pointed to the possibility of the leg sore being of diphtheritic origin On bacteriological examination of surface discharge this proved to be the case The patient was given a course of chloromycetin and improved consistently Antidiphtheritic serum is less satisfactory in treatment of veldt sore than antibiotic drugs

Diphtheria is not a common condition in the tropics, but it is seen from time to time In Ecuador, South America, it is noted[44] that diphtheria is much more



FIG 170
Diphtheroid ulcer on leg—veldt sore

common in Quito the capital, which is high up in the mountains and has an average mean temperature of 52° F, than in Guayaquil on the coast, which has a hot humid climate of the tropical type Diphtheria has also been reported from many of the large centres of South America—Argentine, Uruguay and Brazil Small outbreaks occur at infrequent intervals in the large towns in West Africa, these are possibly due to persons acting as carriers and bringing the infection from Europe

In 1951 four juvenile patients were admitted to Kumasi Hospital, Gold Coast (now Ghana), suffering from diphtheria The first child exhibited urgent respiratory distress, associated with a sore throat A tracheotomy was undertaken soon after admission and the patient given a course of chloromycetin, as it was apparent that he was suffering from a subacute obstructive laryngitis thought to be diphtheritic The patient recovered. The only antidiphtheritic serum available was out of date and thought likely to be useless No case had been seen in the country for several years A second patient was admitted the same day in a

moribund condition and died some minutes after arrival at hospital The nature of the condition was confirmed in both cases Two days later another patient was admitted, a child of about twelve years, also suffering from laryngeal obstruction Although her condition was initially urgent she recovered without tracheotomy being undertaken Chloromycetin was also used in treatment of this third case A fourth case was admitted with similar respiratory distress and a tracheotomy was undertaken but the patient died shortly afterwards Two patients lived and two died, a mortality of 50 per cent Each had been ill at home for several days before admission Not being familiar with the disease the local people did not appreciate its serious nature

As a tracheotomy may appear a very radical measure to undertake in a young child there should be some fixed rule on which to judge the necessity for undertaking the procedure In European patients the light complexion facilitates judgment in determining roughly the degree of anoxæmia present, whether it be moderate or severe In a patient with a dark complexion it is difficult or impossible to assess by appearance alone That a tracheotomy should not be undertaken till the patient is *in extremis* with sucking in of the intercostal muscle spaces is an unnecessary and undesirable loss of time Much the best rule is, if the patient is not urgently distressed and obviously needing an immediate tracheotomy, to make out a pulse chart and take ten minute readings for one hour If the pulse-rate is rising consistently during this time a tracheotomy should certainly be undertaken

Anoxæmia is a very serious condition in any patient, but particularly so in an African patient who shows a sickle cell trait A severe anoxæmia and a high CO_2 blood content is almost certain to precipitate a sickle cell crisis in such patients *To watch the pulse-rate for one hour is an easy and satisfactory method of arriving* at a reasonable decision on measurable data The tracheotomy opening should be made below the level of the cricoid cartilage It is advisable to undertake the operation under local anæsthesia Intravenous barbiturate anæsthesia is very dangerous in these cases which are already partially obstructed If muscular control is lost due to intravenous anæsthetic agents a complete obstruction results General anæsthesia is also unsuitable A large quantity of very weak local anæsthetic, ½ per cent solution of procaine, should be used A very small quantity of adrenaline only should be added, 1 in 400,000 being quite sufficient and much safer than stronger solutions If an adequate quantity of this solution is injected it decreases venous bleeding very much, partly by reason of the adrenaline present and partly by the large quantity of fluid injected which puts pressure on the local veins If a patient is in a distressed condition with a fast pulse-rate, 1 in 100,000 adrenaline solution is not considered safe to use

Alexander,[65] noted that in 1957, during an influenza epidemic in Ghana, a large number of young children were seen with a purulent tracheo-bronchitis of sufficient degree to cause marked respiratory obstruction, some of these cases required tracheotomy There was a very high death rate due to this form of respiratory disease If tracheotomy is called for, it is essential to protect the eyes as well as the nose and throat of the operator when this *operation is being* undertaken The patient in his distress is very liable to blow out fragments of infective material unavoidably from the tracheotomy wound while the tube is

had noticed that on drinking tea there was a tendency for the tea to go into her nose and come out through the nostrils on attempting to swallow it This was the first indication of peripheral neuritis or paresis of the soft palate which pointed to the possibility of the leg sore being of diphtheritic origin On bacteriological examination of surface discharge this proved to be the case The patient was given a course of chloromycetin and improved consistently Antidiphtheritic serum is less satisfactory in treatment of veldt sore than antibiotic drugs

Diphtheria is not a common condition in the tropics, but it is seen from time to time In Ecuador South America it is noted [61] that diphtheria is much more



Fig 170
D phthero d ulcer on leg—veldt sore

common in Quito the capital which is high up in the mountains and has an average
h has a hot humid
from many of the
Small outbreaks
occur at infrequent intervals in the large towns in West Africa these are possibly due to persons acting as carriers and bringing the infection from Europe

In 1951 four juvenile patients were admitted to Kumasi Hospital Gold Coast (now Ghana) suffering from diphtheria The first child exhibited urgent respiratory distress associated with a sore throat A tracheotomy was undertaken soon after admission and the patient given a course of chloromycetin as it was apparent that he was suffering from a subacute obstructive laryngitis thought to be diphtheritic The patient recovered The only antidiphtheritic serum available was out of date and thought likely to be useless No case had been seen in the country for several years A second patient was admitted the same day in a

moribund condition and died some minutes after arrival at hospital The nature of the condition was confirmed in both cases Two days later another patient was admitted, a child of about twelve years, also suffering from laryngeal obstruction Although her condition was initially urgent she recovered without tracheotomy being undertaken Chloromycetin was also used in treatment of this third case A fourth case was admitted with similar respiratory distress and a tracheotomy was undertaken but the patient died shortly afterwards Two patients lived and two died, a mortality of 50 per cent Each had been ill at home for several days before admission Not being familiar with the disease the local people did not appreciate its serious nature

As a tracheotomy may appear a very radical measure to undertake in a young child there should be some fixed rule on which to judge the necessity for undertaking the procedure In European patients the light complexion facilitates judgment in determining roughly the degree of anoxæmia present, whether it be moderate or severe In a patient with a dark complexion it is difficult or impossible to assess by appearance alone That a tracheotomy should not be undertaken till the patient is *in extremis* with sucking in of the intercostal muscle spaces is an unnecessary and undesirable loss of time Much the best rule is, if the patient is not urgently distressed and obviously needing an immediate tracheotomy, to make out a pulse chart and take ten-minute readings for one hour If the pulse-rate is rising consistently during this time a tracheotomy should certainly be undertaken

Anoxæmia is a very serious condition in any patient, but particularly so in an African patient who shows a sickle cell trait A severe anoxæmia and a high CO blood content is almost certain to precipitate a sickle cell crisis in such patients To watch the pulse rate for one hour is an easy and satisfactory method of arriving at a reasonable decision on measurable data The tracheotomy opening should be made below the level of the cricoid cartilage It is advisable to undertake the operation under local anæsthesia Intravenous barbiturate anæsthesia is very dangerous in these cases which are already partially obstructed If muscular control is lost due to intravenous anæsthetic agents a complete obstruction results General anæsthesia is also unsuitable A large quantity of very weak local anæsthetic, ½ per cent solution of procaine, should be used A very small quantity of adrenaline only should be added, 1 in 400,000 being quite sufficient and much safer than stronger solutions If an adequate quantity of this solution is injected it decreases venous bleeding very much, partly by reason of the adrenaline present and partly by the large quantity of fluid injected which puts pressure on the local veins If a patient is in a distressed condition with a fast pulse-rate, 1 in 100,000 adrenaline solution is not considered safe to use

Alexander,[65] noted that in 1957, during an influenza epidemic in Ghana, a large number of young children were seen with a purulent tracheo bronchitis of sufficient degree to cause marked respiratory obstruction, some of these cases required tracheotomy There was a very high death rate due to this form of respiratory disease If tracheotomy is called for, it is essential to protect the eyes as well as the nose and throat of the operator when this operation is being undertaken The patient in his distress is very liable to blow out fragments of infective material unavoidably from the tracheotomy wound while the tube is

being inserted If glasses are not worn a glass or plastic shield should be placed before the face, as is sometimes used by those undertaking bronchoscopy

Turnbull[66] reported an outbreak of 100 cases of diphtheria in the Transkei area of Natal, South Africa There had been small outbreaks of six to twelve cases previously noticed The patients were treated with 40,000 to 120,000 units of antidiphtheritic serum daily, penicillin was also given because of streptococci being noted in the throat swabs Wilkins[67] reported seventy-nine cases of diphtheria in Southern Rhodesia in 1956-57 Of these cases seventy-one were in forty-two urban cases amongst per cent, while in twenty nine African rural cases there was a mortality of 26 3 per cent The rural cases may have had a lesser resistance to the infection, but it is usual to find in African practice that patients from country villages come to hospital with much more advanced disease than that seen in patients from the local town who live near the hospital and are familiar with the way attention is sought

Gelfand[68] mentions that Grasset and his colleagues considered that the infrequency with which diphtheria is seen in African patients is probably due to a degree of acquired immunity as a result of earlier outbreaks of the disease amongst them With this expression of opinion in mind, it is of interest to note that Ribeiro[69] refers to the practice of African patients having the uvula cut short as a measure to safeguard them against fatal disease of the throat, which is very much feared He mentions that this minor operation was practised freely in the past at the request of African patients even when no active disease of the throat was present Undoubtedly such a practice must have arisen as a result of the fear of some serious throat ailment with a high mortality rate known to have occurred in the past That diphtheria was the basis of this fear is likely Many cases of diphtheria occurred amongst soldiers in North Africa during World War II Hodson and Stewart[0] noted forty eight cases of diphtheria in the Abadan area of Persia (now Iran) The clinical condition was mild and less severe than usually noted in Europe Diphtheroid bacilli have been noted in sores on horses and camels in desert areas of the Middle East

Treatment of diphtheria by tetracycline drugs is considered to be most efficient Chloromycetin has been used personally and is considered very good The two cases lost in the small series seen in 1951 were admitted into hospital *in extremis* and it is thought that no form of treatment could have saved their lives The dose of chloromycetin suitable for treatment of cases should be regulated according to the patient's age and weight Capsules of 0 25 gm are given, one four-hourly, to children for the first two days and subsequently one three times a day for a further four days For adults, larger doses are necessary—two four times a day for four days is sufficient It is unwise to use tetracycline drugs for more than one week as they may give rise to intestinal complications if treatment is prolonged In the tropics it is unlikely that antidiphtheritic serum will be available or sufficiently fresh if held in stock, except in the large towns

In cases of follicular tonsillitis of non-diphtheritic origin there are fibrinous patches attached to the tonsil for a few days, but these are usually strictly confined to the tonsil tissue itself In diphtheria cases the membranous exudate usually

ribund condition and died some minutes after arrival at hospital The nature the condition was confirmed in both cases Two days later another patient admitted, a child of about twelve years, also suffering from laryngeal truction Although her condition was initially urgent she recovered without heotomy being undertaken Chloromycetin was also used in treatment of this d case A fourth case was admitted with similar respiratory distress and a heotomy was undertaken but the patient died shortly afterwards Two patients d and two died, a mortality of 50 per cent Each had been ill at home for eral days before admission Not being familiar with the disease the local people not appreciate its serious nature

As a tracheotomy may appear a very radical measure to undertake in a young ld there should be some fixed rule on which to judge the necessity for undertaking procedure In European patients the light complexion facilitates judgment in ermining roughly the degree of anoxæmia present, whether it be moderate or ere In a patient with a dark complexion it is difficult or impossible to assess appearance alone That a tracheotomy should not be undertaken till the patient *n extremis* with sucking in of the intercostal muscle spaces is an unnecessary l undesirable loss of time Much the best rule is, if the patient is not ently distressed and obviously needing an immediate tracheotomy, to make a pulse chart and take ten-minute readings for one hour If the pulse-rate ising consistently during this time a tracheotomy should certainly be undertaken

Anoxæmia is a very serious condition in any patient, but particularly so in an ican patient who shows a sickle cell trait A severe anoxæmia and a high CO_2 od content is almost certain to precipitate a sickle cell crisis in such patients watch the pulse rate for one hour is an easy and satisfactory method of arriving a reasonable decision on measurable data The tracheotomy opening should made below the level of the cricoid cartilage It is advisable to undertake the ration under local anæsthesia Intravenous barbiturate anæsthesia is very ngerous in these cases which are already partially obstructed If muscular ntrol is lost due to intravenous anæsthetic agents a complete obstruction results neral anæsthesia is also unsuitable A large quantity of very weak local esthetic, ½ per cent solution of procaine, should be used A very small quantity adrenaline only should be added, 1 in 400,000 being quite sufficient and much er than stronger solutions If an adequate quantity of this solution is injected decreases venous bleeding very much, partly by reason of the adrenaline present d partly by the large quantity of fluid injected which puts pressure on the local ns If a patient is in a distressed condition with a fast pulse-rate, 1 in 100,000 renaline solution is not considered safe to use

Alexander,[65] noted that in 1957, during an influenza epidemic in Ghana, a ge number of young children were seen with a purulent tracheo-bronchitis of ficient degree to cause marked respiratory obstruction, some of these cases quired tracheotomy There was a very high death-rate due to this form of piratory disease If tracheotomy is called for, it is essential to protect the eyes well as the nose and throat of the operator when this operation is being dertaken The patient in his distress is very liable to blow out fragments of ective material unavoidably from the tracheotomy wound while the tube is

being inserted If glasses are not worn a glass or plastic shield should be placed before the face, as is sometimes used by those undertaking bronchoscopy

Turnbull[66] reported an outbreak of 100 cases of diphtheria in the Transkei area of Natal, South Africa There had been small outbreaks of six to twelve cases previously noticed The patients were treated with 40,000 to 120,000 units of antidiphtheritic serum daily, penicillin was also given because of streptococci being noted in the throat swabs Wilkins[67] reported seventy-nine cases of diphtheria in Southern Rhodesia in 1956-57 Of these cases seventy-one were in African patients and eight in Europeans In forty-two urban cases amongst African patients there was a mortality rate of 4 8 per cent, while in twenty-nine African rural cases there was a mortality of 26 3 per cent The rural cases may have had a lesser resistance to the infection, but it is usual to find in African practice that patients from country villages come to hospital with much more advanced disease than that seen in patients from the local town who live near the hospital and are familiar with the way attention is sought

Gelfand[68] mentions that Grasset and his colleagues considered that the infrequency with which diphtheria is seen in African patients is probably due to a degree of acquired immunity as a result of earlier outbreaks of the disease amongst them With this expression of opinion in mind, it is of interest to note that Ribeiro[69] refers to the practice of African patients having the uvula cut short as a measure to safeguard them against fatal disease of the throat, which is very much feared He mentions that this minor operation was practised freely in the past at the request of African patients even when no active disease of the throat was present Undoubtedly such a practice must have arisen as a result of the fear of some serious throat ailment with a high mortality rate known to have occurred in the past That diphtheria was the basis of this fear is likely Many cases of diphtheria occurred amongst soldiers in North Africa during World War II Hodson and Stewart[70] noted forty-eight cases of diphtheria in the Abadan area of Persia (now Iran) The clinical condition was mild and less severe than usually noted in Europe Diphtheroid bacilli have been noted in sores on horses and camels in desert areas of the Middle East

Treatment of diphtheria by tetracycline drugs is considered to be most efficient Chloromycetin has been used personally and is considered very good The two cases lost in the small series seen in 1951 were admitted into hospital *in extremis* and it is thought that no form of treatment could have saved their lives The dose of chloromycetin suitable for treatment of cases should be regulated according to the patient's age and weight Capsules of 0 25 gm are given, one four hourly, to children for the first two days and subsequently one three times a day for a further four days For adults, larger doses are necessary—two four times a day for four days is sufficient It is unwise to use tetracycline drugs for more than one week as they may give rise to intestinal complications if treatment is prolonged In the tropics it is unlikely that antidiphtheritic serum will be available or sufficiently fresh if held in stock, except in the large towns

In cases of follicular tonsillitis of non-diphtheritic origin there are fibrinous patches attached to the tonsil for a few days, but these are usually strictly confined to the tonsil tissue itself In diphtheria cases the membranous exudate usually

moribund condition and died some minutes after arrival at hospital The nature of the condition was confirmed in both cases Two days later another patient was admitted, a child of about twelve years, also suffering from laryngeal obstruction Although her condition was initially urgent she recovered without tracheotomy being undertaken Chloromycetin was also used in treatment of this third case A fourth case was admitted with similar respiratory distress and a tracheotomy was undertaken but the patient died shortly afterwards Two patients lived and two died, a mortality of 50 per cent Each had been ill at home for several days before admission Not being familiar with the disease the local people did not appreciate its serious nature

As a tracheotomy may appear a very radical measure to undertake in a young child there should be some fixed rule on which to judge the necessity for undertaking the procedure In European patients the light complexion facilitates judgment in determining roughly the degree of anoxæmia present, whether it be moderate or severe In a patient with a dark complexion it is difficult or impossible to assess by appearance alone That a tracheotomy should not be undertaken till the patient is *in extremis* with sucking in of the intercostal muscle spaces is an unnecessary and undesirable loss of time Much the best rule is, if the patient is not urgently distressed and obviously needing an immediate tracheotomy, to make out a pulse chart and take ten-minute readings for one hour If the pulse-rate is rising consistently during this time a tracheotomy should certainly be undertaken

Anoxæmia is a very serious condition in any patient, but particularly so in an African patient who shows a sickle cell trait A severe anoxæmia and a high CO_2 blood content is almost certain to precipitate a sickle cell crisis in such patients To watch the pulse-rate for one hour is an easy and satisfactory method of arriving at a reasonable decision on measurable data The tracheotomy opening should be made below the level of the cricoid cartilage It is advisable to undertake the operation under local anæsthesia Intravenous barbiturate anæsthesia is very dangerous in these cases which are already partially obstructed If muscular control is lost due to intravenous anæsthetic agents a complete obstruction results General anæsthesia is also unsuitable A large quantity of very weak local anæsthetic, ¼ per cent solution of procaine, should be used A very small quantity of adrenaline only should be added, 1 in 400,000 being quite sufficient and much safer than stronger solutions If an adequate quantity of this solution is injected it decreases venous bleeding very much, partly by reason of the adrenaline present and partly by the large quantity of fluid injected which puts pressure on the local veins If a patient is in a distressed condition with a fast pulse-rate, 1 in 100,000 adrenaline solution is not considered safe to use

Alexander,[65] noted that in 1957, during an influenza epidemic in Ghana, a large number of young children were seen with a purulent tracheo bronchitis of sufficient degree to cause marked respiratory obstruction, some of these cases required tracheotomy There was a very high death-rate due to this form of respiratory disease If tracheotomy is called for, it is essential to protect the eyes as well as the nose and throat of the operator when this operation is being undertaken The patient in his distress is very liable to blow out fragments of infective material unavoidably from the tracheotomy wound while the tube is

being inserted If glasses are not worn a glass or plastic shield should be placed before the face, as is sometimes used by those undertaking bronchoscopy

Turnbull[66] reported an outbreak of 100 cases of diphtheria in the Transkei area of Natal, South Africa There had been small outbreaks of six to twelve cases previously noticed The patients were treated with 40,000 to 120,000 units of antidiphtheritic serum daily, penicillin was also given because of streptococci being noted in the throat swabs Wilkins[67] reported seventy-nine cases of diphtheria in Southern Rhodesia in 1956-57 Of these cases seventy one were in African patients and eight in Europeans In forty-two urban cases amongst African patients there was a mortality rate of 4 8 per cent, while in twenty-nine African rural cases there was a mortality of 26 3 per cent The rural cases may have had a lesser resistance to the infection, but it is usual to find in African practice that patients from country villages come to hospital with much more advanced disease than that seen in patients from the local town who live near the hospital and are familiar with the way attention is sought

Gelfand[68] mentions that Grasset and his colleagues considered that the infrequency with which diphtheria is seen in African patients is probably due to a degree of acquired immunity as a result of earlier outbreaks of the disease amongst them With this expression of opinion in mind, it is of interest to note that Ribeiro[69] refers to the practice of African patients having the uvula cut short as a measure to safeguard them against fatal disease of the throat, which is very much feared He mentions that this minor operation was practised freely in the past at the request of African patients even when no active disease of the throat was present Undoubtedly such a practice must have arisen as a result of the fear of some serious throat ailment with a high mortality rate known to have occurred in the past That diphtheria was the basis of this fear is likely Many cases of diphtheria occurred amongst soldiers in North Africa during World War II Hodson and Stewart[70] noted forty eight cases of diphtheria in the Abadan area of Persia (now Iran) The clinical condition was mild and less severe than usually noted in Europe Diphtheroid bacilli have been noted in sores on horses and camels in desert areas of the Middle East

Treatment of diphtheria by tetracycline drugs is considered to be most efficient Chloromycetin has been used personally and is considered very good The two cases lost in the small series seen in 1951 were admitted into hospital *in extremis* and it is thought that no form of treatment could have saved their lives The dose of chloromycetin suitable for treatment of cases should be regulated according to the patient's age and weight Capsules of 0 25 gm are given, one four-hourly, to children for the first two days and subsequently one three times a day for a further four days For adults, larger doses are necessary—two four times a day for four days is sufficient It is unwise to use tetracycline drugs for more than one week as they may give rise to intestinal complications if treatment is prolonged In the tropics it is unlikely that antidiphtheritic serum will be available or sufficiently fresh if held in stock, except in the large towns

In cases of follicular tonsillitis of non-diphtheritic origin there are fibrinous patches attached to the tonsil for a few days, but these are usually strictly confined to the tonsil tissue itself In diphtheria cases the membranous exudate usually

extends well on to the fauces, and this is typical of the condition If doubt exists in a case thought to be follicular tonsillitis, a bacteriological examination should *certainly* be undertaken, and the case treated as one of diphtheria Vincent's angina type of tonsillitis gives rise to a very irregular ulcerated-looking condition of the tonsil, the inflammation extending on to the pillars of the fauces and the gums and pharynx, but it does not give rise to a membranous-looking exudate but rather a definite ulcerated-looking appearance Vincent's angina cases show large numbers of spirochætes and typical fusiform bacilli when swab specimens are appropriately stained with gentian violet Great care must be taken in any of these throat conditions when taking throat swabs, as it can be highly dangerous if a patient gives a convulsive cough when a painful throat is touched by the swab Glasses and a mask should certainly be worn for self-protection Ulceration of the throat due to agranulocytosis is rarely seen and there is usually a history of the patient having taken large doses of sulpha drugs injudiciously before it occurs Chronic forms of ulceration of the throat are unlikely to give rise to difficulty in diagnosis as the length of the history alone suggests that they are not of acute inflammatory origin

Gas Gangrene

The causative organisms of gas gangrene produce a rapidly spreading inflammatory œdema with necrosis and gangrene of the tissues as well as gas production following contamination of a local wound There are many conditions associated with the presence of gas in the tissues which are not due to infection by any of the organisms of the Clostridium group These will be referred to later Gas gangrene is due to organisms some of which are saccharolytic, such as *Clostridium welchii* and *Cl septicum*, and others which are proteolytic such as *Cl sporogenes* and *Cl histolyticum* There are several other organisms in each class These organisms are spore-forming and anaerobic in type, they therefore grow best well hidden in the deep tissues, away from freely accessible oxygen Their principal source is animal and human excreta Gas gangrene therefore occurs most commonly following contamination of compound fractures by organic matter during street accidents and on farmlands The condition, unfortunately, is still comparatively common in many tropical countries The saccharolytic organisms ferment sugar and produce gas They account for the peculiar characteristic sour smell noted and the gas production associated with it The proteolytic organisms cause blackening of muscle tissues

Those who have seen many cases of gas gangrene are usually quite familiar with the characteristic smell present in these cases and the peculiar reddish-brown shade associated with the hæmorrhagic discharge on the wound dressings Gas gangrene is rare in superficial wounds though it may occur One case occurred in a European patient in Accra who sustained quite a small abrasion about the dorsum of the hand He developed rapidly spreading bubbles of gas in the subcutaneous tissues within twenty-four hours of the injury The infection was controlled by large doses of penicillin during the next three days The incubation period of gas gangrene is only twenty-four hours If there is no evidence of gas

being inserted If glasses are not worn a glass or plastic shield should be placed before the face, as is sometimes used by those undertaking bronchoscopy

Turnbull[66] reported an outbreak of 100 cases of diphtheria in the Transkei area of Natal, South Africa There had been small outbreaks of six to twelve cases previously noticed The patients were treated with 40,000 to 120,000 units of antidiphtheritic serum daily, penicillin was also given because of streptococci being noted in the throat swabs Wilkins[67] reported seventy-nine cases of diphtheria in Southern Rhodesia in 1956-57 Of these cases seventy-one were in African patients and eight in Europeans In forty-two urban cases amongst African patients there was a mortality rate of 4 8 per cent, while in twenty-nine African rural cases there was a mortality of 26 3 per cent The rural cases may have had a lesser resistance to the infection, but it is usual to find in African practice that patients from country villages come to hospital with much more advanced disease than that seen in patients from the local town who live near the hospital and are familiar with the way attention is sought

Gelfand[68] mentions that Grasset and his colleagues considered that the infrequency with which diphtheria is seen in African patients is probably due to a degree of acquired immunity as a result of earlier outbreaks of the disease amongst them With this expression of opinion in mind, it is of interest to note that Ribeiro[69] refers to the practice of African patients having the uvula cut short as a measure to safeguard them against fatal disease of the throat, which is very much feared He mentions that this minor operation was practised freely in the past at the request of African patients even when no active disease of the throat was present Undoubtedly such a practice must have arisen as a result of the fear of some serious throat ailment with a high mortality rate known to have occurred in the past That diphtheria was the basis of this fear is likely Many cases of diphtheria occurred amongst soldiers in North Africa during World War II Hodson and Stewart[70] noted forty-eight cases of diphtheria in the Abadan area of Persia (now Iran) The clinical condition was mild and less severe than usually noted in Europe Diphtheroid bacilli have been noted in sores on horses and camels in desert areas of the Middle East

Treatment of diphtheria by tetracycline drugs is considered to be most efficient Chloromycetin has been used personally and is considered very good The two cases lost in the small series seen in 1951 were admitted into hospital *in extremis* and it is thought that no form of treatment could have saved their lives The dose of chloromycetin suitable for treatment of cases should be regulated according to the patient's age and weight Capsules of 0 25 gm are given, one four-hourly, to children for the first two days and subsequently one three times a day for a further four days For adults, larger doses are necessary—two four times a day for four days is sufficient It is unwise to use tetracycline drugs for more than one week as they may give rise to intestinal complications if treatment is prolonged In the tropics it is unlikely that antidiphtheritic serum will be available or sufficiently fresh if held in stock, except in the large towns

In cases of follicular tonsillitis of non diphtheritic origin there are fibrinous patches attached to the tonsil for a few days, but these are usually strictly confined to the tonsil tissue itself In diphtheria cases the membranous exudate usually

in spite of large doses of penicillin, an amputation should be undertaken It i essential to amputate above the level of the muscle group involved by the infection To amputate through the infected area is not satisfactory It is necessary in mos cases of gas gangrene occurring at any part of the leg between the ankle and th knee to amputate the limb at the mid-thigh position To undertake a lower le amputation through infected muscle tissue is dangerous and unsatisfactory an will in a high proportion of cases necessitate a secondary amputation higher u at a later time, if the patient does not lose his life The chances of removing on group of muscles successfully with a view to eradicating a gas gangrene infectio and yet saving the limb are poor In most cases the infection is widespread and no confined to one muscle group There is a temptation in some circumstances t depend on the use of large doses of antibiotic drugs to control the infection an avoid operative surgery

An instructive case in this respect was that of a young woman treated by my assistant (Mr C E Harding) The patient was admitted to hospital following a severe lorry accident She was unconscious when first seen There was a fracture of the skull present, a compound fracture of the right arm at the level of the midshaft of the humerus and a simple fracture of the left leg Her prognosis appeared very poor On the second day following the accident it was apparent that she was developing gas gangrene in the tissues of the right arm at the site of the compound fracture The bubbles in the tissues reached to above the shoulder joint within eight hours of it being detected Not only was she thought unfit for amputation of the right arm because of her multiple injuries, but the gas had spread so rapidly that a shoulder amputation would still not have removed all the infected tissues It was therefore decided that to rely on large doses of penicillin was in this case the wisest course to adopt Within a further forty eight hours the gas bubbles had disappeared, the arm below the fracture became gangrenous and within five days sloughed off completely (Fig 171) The patient was ultimately left with a right upper arm stump of about 6 in in length She recovered from her injuries slowly and the arm stump healed She left hospital after three months walking reasonably well and quite sensible The arm stump appeared quite as good as might be expected following a mid-arm amputation She could move the stump well and hold articles in the right axilla Apart from penicillin and tetracycline drugs it is a great advantage to give patients who have suffered from gas gangrene a blood transfusion to replace blood lost at the time of the accident or damaged subsequently by hæmolytic processes associated with infection

If bubbles in the tissues are in all cases interpreted as being due to gas gangrene many alarming situations will arise when the [illegible] other than infection with members of the Clostridium [illegible] be appreciated that surgical emphysema about [illegible] ries is of quite a different category of disease and much less serious in nature The treatment is also different Gas may occur in the tissues as a result of a wound through which organisms gain entrance from either the intestinal tract, the genito urinary tract or the respiratory passages Injuries of the rectum often give rise to gas in the perirectal tissues which, though serious, are not necessarily due to gas gangrene

in the tissues within thirty hours the condition is unlikely to develop later Th predisposing factors in this form of inflammation are damage of a maj blood-vessel on the proximal side of the injury which cuts off the oxygen supp of distal tissues and laceration of muscle in a deep wound There is essential the entrance of the characteristic organisms into the wound at the time the injury

The incidence of gas gangrene can be much reduced by early and efficie debridement of compound fractures and wounds involving muscle layers Th risk is increased by suturing infected wounds tightly After adequate excision damaged muscle and lacerated skin edges they should be only lightly drawn togeth with the minimum of stitches To clean the wounds with hydrogen peroxid following debridement is of some advantage The risk of gas gangrene is great increased by the presence of an undetected foreign body left in the tissues Bitin and mauling by large animals in the tropics is very liable to cause gas gangren Some cases of this type have been noted Gas gangrene is usually thought in relation to deep muscle wounds and compound fractures, but it should b remembered that as the source of the infecting bacilli is the intestinal content the healing of anastomotic junctions may be interfered with by organisms of th Clostridium group This is most likely to occur where anastomoses are undertake as emergency procedures, in the absence of adequate preliminary preparation the bowel

Prior to the introduction of the sulpha drugs or any of the antibiotic grou of drugs, it was well known that intestinal anastomoses were much more likely t be successful if the patient was given a dose of anti-gas gangrene serum befor and after operation. This possible aspect of gas gangrene should be remembere when undertaking intestinal surgery It is desirable to sterilise the bowel by lo solubility sulpha preparations and penicillin in these cases If compound fracture are treated by dressings and penicillin and supported on splints alone without an operative surgery, gas gangrene is liable to develop in about 10 per cent of th cases If a careful debridement operation is undertaken followed by dressing and a plaster-of-Paris cast applied, the risk of gas gangrene is reduced t approximately 1 per cent Anti-gas gangrene serum is of less value than penicill in cases of infection by the Clostridium group of bacteria

With the appearance of gas gangrene there is a marked increase in pain locally Much local swelling develops, and there is an onset of redness about the edge of the wound The pigmentation has a characteristic brownish-red shade abou it suggestive of the infection The temperature rises to 103° or 104° F, and ga can be felt in the tissues adjacent to the wound within thirty hours of the acciden The patient feels very ill, with a marked sense of apathy Because of the specifi action of penicillin against the organisms of this infection, it is advisable in a cases of compound fractures to give an initial dose of penicillin of 1 million unit preferably using penicillin of the long acting type Subsequent doses of penicilli can be smaller in amount The tetracycline drugs also give excellent results i cases of gas gangrene

Before these drugs were available the only life-saving measure was earl amputation, but this is now not essential If the infection is massive and spread

disease The human subject contracts infection by drinking infected milk or by contact with infected farm animals Brucellosis occurs on *rare occasions in West Africa*

Hughes,[1] investigating this disease in farm animals in the Gold Coast (now Ghana), noted the following *results*

Animal	Number Examined	Number Positive	Percentage
Cows	50	18	36 0
Bulls	23	3	13·0
Sheep	18	1	5 5
Goats	18	0	

A small number of human cases of brucellosis in Ghana have given positive agglutination reactions against the abortus variety of the disease Robinson[2] *isolated the organism from cases in West Africa*, so that although brucellosis is not common in that part of the world it definitely exists to a small extent and should be considered in diagnosis of obscure fevers, *particularly where they are associated* with joint disturbances

The first case of brucellosis personally encountered was noted in southern *England in 1932 The patient contracted an infection from drinking goat's milk* in the Seaford area of Sussex, where cases occur from time to time The patient ran an undulating fever for four months Tetracycline drugs were not available for treatment at that date

Several reports of brucellar infection have come from East Africa within the last few years The condition is being recognised with increasing frequency in that area of the world

Before the precise nature of *Brucella melitensis* infections was determined in the Malta area, where it was frequently seen, the condition was popularly termed "Mediterranean tuberculosis," for although it was in no way related to tuberculosis there is some clinical similarity between the two conditions The illness, also termed "Malta fever," is in most cases a low grade generalised infection, there is a marked predisposition to involvement of bones and joints The general tendency is for the melitensis infections to be more acute, causing rather more severe symptoms than the abortus type The less acute varieties have [illegible]

At the early stage of brucellar infections there are usually severe sympto[illegible] Manson-Bahr,[3] noting acute cases, comments on the prominence of fever, cough and joint pains, there is in addition enlargement of the spleen, looseness of the bowels and tinnitus Epistaxis may occur, as is not unusual with any high fever The acute phase is associated with a septicæmia The organisms are difficult to isolate *in blood* cultures and not more than 10 per cent of cases give a positive blood culture, even at the acute stage

Mention has been made of cases where, following an extraperitoneal rupture of the uterus in childbirth, a woman develops bubbles of air in the tissues of the lower abdominal wall or in the prepubic position In cases of extravasation of urine in male patients where the urinary tract is infected with coliform bacilli, much gas often occurs in the tissues of the scrotum and about the base of the penis This also is not gas gangrene even though the patient is quite ill with the condition

Following clean abdominal surgical wounds, such as hernia wounds, air is sometimes enclosed between the layers of the abdominal wall although they are quite clean In many cases, but not all, where there is air in the tissues there is infection present Following frontal sinus operations there is not infrequently a limited amount of air in the tissues for one or two days following operation, but



FIG 171
Spontaneous amputation of right arm in gas gangrene case
Dr C E Harding s case

this invariably settles down without difficulty or special treatment, and a frontal sinus wound usually heals by primary union in spite of the initial infection in the sinus for which the operation was carried out Study of the temperature chart usually gives a good indication of the presence or otherwise of infection

Brucellosis

This is a disease which is present to a small extent in many parts of the tropical world Cases have been reported from Central and South America, various parts of Africa, India and South East Asia Brucellosis is difficult to diagnose clinically because it lacks characteristics which can be recognised easily The causative organisms are difficult to isolate They are short Gram negative bacilli of 1 to 2 microns in length, some of the organisms being almost circular Infection with brucellosis is contracted from various animals

Brucella melitensis is associated with goats, *Br abortus* with cattle and *Br suis* with pigs Many of the animals so affected do not show any clinical evidence of

any chronic illness, attention to general health is most important—tonics, vitamins and improved diet are beneficial

Plague

Outbreaks of plague oc[illegible]
in the tropics Large town
population in these places [illegible]
principally rats Rat fleas become infected from the diseased *animals, and these* fleas in turn infect human subjects The initial cases usually occur in hunters who then carry the infection to the towns The organism of plague is a very short oval bacillus of 1 5 to 2 microns *in length It is Gram-negative* on staining Using methylene blue to demonstrate the organism, staining is seen to be much more marked at the rounded ends of the bacilli than elsewhere, this is very *characteristic The organism is non motile* and non-sporing

Plague infections are exhibited clinically in three characteristic forms

1 Pneumonic—where there is an acute pulmonary congestive disease with toxicity
2 Bubonic—with enlarged lymphatic glands associated with a local lesion on the limb
3 Septicæmic—a generalised infection without obvious localised disease

In the pneumonic type the disease is spread from patient to patient by droplet infection In the bubonic type the axillary, cervical or groin lymphatic glands become acutely inflamed and enlarged, there is frequently an adjacent sore spot at a site in the field of lymphatic drainage There is marked associated periadenitis and the skin over the involved gland becomes necrotic In the septicæmic variety of the disease there is no obvious portal of entry of the infection and it is presumed to be due to a flea bite causing infection direct into the blood stream In all types the patients are urgently ill

Plague should be considered in all cases in the tropics where a patient is urgently ill with acutely inflamed lymphatic glands in the groin or axilla There is usually an incubation period of three to five days following contamination by whatever route infection is contracted Sometimes the incubation is as long as *ten days*

Wosfold [81] noted a small outbreak of bubonic plague at Chilokoloki in Northern Rhodesia Nine cases were seen As well as enlarged glands being present, there was *fever and a marked degree of mental excitability The plague bacilli* were demonstrated in gland puncture preparations

The mental excitability is a feature of interest and diagnostic value and is due to the markedly toxic *effects of this organism The patients show all the signs* of an acute febrile condition with high irregular fever of no fixed pattern there is fast pulse and respiration rate, chills and rigors are prominent, vomiting and dizziness are common, conjunctival *congestion is often seen and there is severe* headache These signs are not necessarily characteristic of plague but occur in any severe infective fever Local glandular enlargement should be looked for and, if noted, a gland puncture should *be undertaken so that direct slides be*

The three different strains of Brucella give rise to somewhat different clinical types of disease *Br melitensis* tends to give rise to the more acute febrile conditions while *Br abortus* gives rise to a *less* acute type *with less pyrexia but* of a more chronic character, more frequently associated with bone and joint involvement *Br suis* is rather like a combination of the other two types, being initially a severe fever, and there is a marked tendency for it to be followed by joint involvement No case of the *Br suis* type has been seen personally

[illegible]

the acute stage of the disease enlargement of the liver is a prominent feature as well as splenic enlargement Mather,[74] working in India, noted cases of enlargement of the liver due to brucellosis These cases were usually initially mistaken for amœbic hepatitis, they were ultimately identified by serological methods Spink and McCullough [75] advise culture of sternal puncture material for brucellosis as being the best method of obtaining a positive result

Honey and Gelfand [76] dealt with a case of chronic pyelonephritis due to brucellosis in East Africa The patient had, in addition to his renal disease, a chronic bone sinus of the leg and also a sinus of the sternum The case had many characteristics suggestive of tuberculosis, but no tubercle bacilli could be found on any occasion There was some calcification in the parenchyma of the kidney, but this was in the peripheral area of the organ, unlike tuberculous calcification, where the calcium deposition tends to be near the apices of the pyramids, rather central in position The case was ultimately proved to be one of chronic brucellosis

Renal involvement and bone and joint implication in brucellosis are all features also noted in tuberculous disease Trevor Jones [77] notes that a positive joint culture is frequently found in brucellosis cases on using aspirated synovial fluid even in cases where blood culture is negative Clinically, a low-grade arthritis with effusion, following a rather indefinite illness like influenza, should suggest the possibility of the condition being due to brucellosis, and this matter requires investigation Spondylitis or arthritis of the spine is liable to occur following brucellar infections

The Brucella group of organisms give rise to arthritic changes which on X-ray examination give appearances not unlike those of rheumatoid arthritis There is a loss of intervertebral joint space in spinal cases, with osteophytic changes around the ligamentous attachments Between the vertebral bodies there are bridges of bone in advanced cases and the mobility of the spine is seriously interfered with Mantle [78] notes several cases with very advanced bone changes on radiology In the majority of his cases the infecting organism was *Br abortus*

Treatment of brucellosis, in all its forms, is best undertaken with tetracycline drugs Ralston [79] advocated chloramphenicol and aureomycin, but considers the former the drug of choice He is of opinion that it gives better results particularly in cases with joint involvement Sanchez [80] treated thirteen cases of brucellosis in Guatemala with Achromycin with excellent results Following eradication of the causative organism, secondary complications in joints require physiotherapy to increase the range of movement, which has been reduced by the infection Following

recent acute illness, as they do not necessarily associate the earlier illness with the jaundice present Great care is necessary that an error in diagnosis is not made in these cases Difficulty arises if, following what was thought to be a straightforward surgical procedure, the patient becomes jaundiced during early convalescence. The possibility that the *jaundice is a direct complication* of the recent surgery must be considered, this being the most likely cause of *this complication* The likelihood of an infective jaundice occurring during convalescence is small Timed surgery should be avoided in non urgent cases during an epidemic of infective jaundice of any sort Any patient who has in the past suffered from an infective liver condition *giving rise to jaundice* has a somewhat raised risk of developing gall stones at a later date The many possible causes of jaundice must be given consideration

The identification of the different treponemal conditions depends on the *finding of the causative* organisms from various sites in the body, depending on the nature of the infection, and noting their characteristics under the microscope The site from which the infective material is taken for examination is most important

Bacteriology is a highly specialised subject, yet it is essential, particularly for those working in the tropics, to have a reasonable practical knowledge of the simple procedures which it is necessary to employ for the rapid identification of certain *bacterial diseases Serology is in most cases beyond the scope of doctors working* in small country stations where their time is fully occupied dealing with very large numbers of patients With these limitations in view, it is suggested that the easiest method of determining into which group the various treponema should be placed is by assessment of two important factors

1 *The length of any particular treponema relative to the* red blood cells
2 The site in which they are found—the blood stream, surface discharges, etc

For the identifica [illegible] essential
to work *in a dark ro*
for this examination
treponema belongs can be ascertained For practical purposes it can be take[illegible]
that the diameter of a red blood cell is 7 microns On the basis of length alone, four subdivisions can be made

Treponema can be divided into those of 4 red cell diameters, 3 red cell diameters, 2 red *cell diameters or 1 red cell diameter From the Extract* given it will be seen that those of the 4 red cell diameter range and 3 red cell diameter size correspond to the Borrelia group of the bacteriology nomenclature, those of 2 red *cell diameters to the Leptospira and* the Treponema type, those of 1 red cell diameter to the Spirillum type If the site of origin in which the organism has been found is known it can be further *classified The Borrelia* type of long length 4 red blood cell diameters, taken from ulcerated surfaces, are almost certainly *Borrelia refringens* or *B vincenti* Both of these spirochætes *are of very large size* and stain easily with 1 per cent methyl violet, and this is the best method of demonstrating them They are Gram negative, but if Gram s stain *is used when* pus containing them is examined, the blueness of the preparation is so intense

prepared for microscopic examination A guinea pig should be injected with suspect material, for in this animal results are most likely to be positive

During epidemics of plague there is considerable risk to laboratory workers and health officials in dealing with the cases Hoekenga,[82] dealing with cases of plague in the Americas, recommended the use of hyperimmune rabbit serum injections for persons exposed to a high risk The use of this serum confers a three months' immunity on the person receiving it This substance is also useful in treatment Plague vaccine, known as Haffkine s vaccine, is also used to confer [illegible]

of sulpha drugs treatment was symptomatic and the death rate was over 80 per cent Sulpha drugs have been used with some success, but they have been replaced first by streptomycin in treatment and still more recently by the tetracycline antibiotic preparations which give good results Cheng,[83] working at Fukien in 1949, treated three cases of bubonic plague successfully with streptomycin A preliminary course of sulphadiazine had been given without obvious benefit Feng[84] treated a case of primary pneumococcal plague successfully at Fouchou using streptomycin and sulphadiazine The tetracycline antibiotic drugs are considered very effective in treatment and have completely changed the outlook in this disease

During epidemics of plague an intradermal skin sensitivity test can be used for cases suspected of being in the early stage of plague infections An injection of filtrate is prepared by removing an active plague gland and, after mincing it, sterilising it by boiling Following intradermal injection there is marked reaction in positive plague cases while in non infected persons the reaction is little more than that seen in the control injection area

A condition closely allied to plague is tularæmia It is contracted from infected animals, particularly hares, rabbits and squirrels This condition, not unlike plague, is highly infectious and infection occurs most commonly in laboratory workers The condition has been described in America, Europe and Japan It occurs in temperate zones more frequently than in the tropics It is treatable with tetracycline antibiotic drugs

TREPONEMATOSIS

The main importance of treponematosis (previously designated as the spirochætal diseases) to those undertaking surgical work in the tropics lies largely in the fact that *in a patient suffering from jaundice it is necessary to come to an* accurate decision as to whether the jaundice seen in a patient is of a post infective type or due to biliary obstruction of some sort In any patient suffering from defective liver function, whether associated with jaundice or not, there is a high surgical risk if an operation is undertaken for any reason, either as an emergency procedure or as a timed intervention Patients are sometimes seen who arrive about two months after a febrile attack They are running no pyrexia but show a considerable degree of jaundice They seldom mention that they have had a

Various types are described depending on the area of the world in which the disease is found rather than because of the difference in the organisms *Borrelia obermeieri* of relapsing fever in Europe, *B duttoni* in African relapsing fever and *B carteri* of relapsing fever in India Only a small number of cases of relapsing fever have been personally recognised The first case seen was in Gambia in 1935, the patient was admitted to hospital in an unconscious condition He had been picked up in a derelict state near a refuse dump Initially it was thought that he was likely to be suffering from advanced sleeping sickness On making a wet blood preparation to look for trypanosomes there were obvious living organisms present, but they did not look like trypanosomes The movement was quite obvious amongst the red cells, but the body of any organism could not be seen clearly The dark ground illumination apparatus was not being used as it was not necessary for the identification of trypanosomes which were being looked for The red blood cells were being agitated in certain areas of the microscopic field indicating that there was something present and alive at those places, but they were obviously not trypanosomes Thick blood slides were then made and stained with Giemsa's stain and many very large spirochætes were seen, approximately the length of 3 red blood cell diameters This immediately placed them in the relapsing fever class The patient died within twelve hours of admission, being in a moribund state when first seen

In West, Central and East Africa relapsing fever is transmitted by the tick *Ornithodoros moubata* It also occurs in horses and cattle and they are a possible reservoir of infection

The leptospiroses, or infective jaundice group of diseases, has several clinical variants, known variously as Weil's disease, trench fever, seven day fever of the Far East They are all fevers caused by contamination of water and foodstuffs by the urine of various infected rodents—rats, mice and field voles There is no intermediate carrier vector Direct contamination is the means of spread

Leptospirosis is an acute febrile illness of five to ten days' duration It is followed in a high proportion of cases by jaundice The jaundice may go on for two or three months, that is, long after the febrile condition has passed off In mild cases there is no jaundice During the febrile stage the causative organism is found in the blood After the fever has settled down the organisms disappear from the blood stream, but may still be detected in the urine as they continue to be excreted through the kidneys They are in some cases found on centrifuging the urine and examining the deposit by the dark ground illumination method Personally, this method of examination has seldom been found successful In this disease there is a tendency to hæmorrhages, as the name of the causative organism implies, *Leptospira icterohæmorrhagiæ* In some cases of Weil's disease there is enlargement of local lymphatic glands adjacent to an initial surface lesion and the causative organism can sometimes be detected in juice extracted from the local gland by gland puncture

In cases where relapsing fever is suspected but no organisms can be found on dark ground illumination, on examination of blood, they can be recovered by injecting 1 c c of the patient's blood into the peritoneal cavity of a mouse The mouse develops a heavy blood infection within one week of the injection Blood

that the treponema are not very easy to see Staining by methyl violet is therefore recommended The long treponema are usually associated with fusiform bacilli The combination is very characteristic The next group, the Borrelia of the 3 red blood cell diameter class, taken from the blood stream, belong to the group constituting the relapsing fevers of various types The type of relapsing fever present can be judged by the area of the world in which the disease is found Treponema of the 2 red blood cell diameter class may be of the Leptospira or the Treponema type These can be differentiated on the grounds of the situation in which they are found The spirochætes of this length, 2 red blood cell diameters, most easily found in blood stream infections, are those causing Weil's disease or leptospiral jaundice The treponema of syphilis, although causing a blood infection, is not easy to find in the blood stream

The treponema of syphilis and yaws have a particular and important character in that they are lodged in the deep layers of the skin in the lesions they produce This is important in differentiating them from the non-pathogenic surface spirochætes found in genital secretions of both male and female patients The non-pathogenic spirochætes are not associated with ulcerative lesions and they can be removed by adequate surface cleansing, as they do not involve the deep tissues It is therefore important, when making an examination for the spirochætes of syphilis and yaws, that any ulceration present should be adequately cleaned by first swabbing thoroughly with sterile saline By so doing, only serum expressed from the deep tissues is collected and examined If spirochætes are found in the serum so expressed from the deep tissues they are almost certainly of syphilitic origin The characteristic genital ulcer associated with syphilis is usually sufficient to warrant considering it of this nature The lesions of yaws are usually elsewhere on the body than on the genital organs Non-pathogenic spirochætes of the 2 red blood cell diameter can often be found in genital secretions in the absence of any ulceration, the absence of penetration into the deep layers of the skin is important in differentiating them from the spirochætes of syphilis

There is only one very short spirochæte in the Spirillum class, this is found in the blood stream It is slightly less than the diameter of 1 red blood cell, being only 4 to 6 microns in length, it never exceeds 7 microns *Spirillum minus* is the causative organism of rat-bite fever, it is appropriately named because of its small size

The very long spirochætes of the Borrelia class of 4 red blood cell diameter length can be found in almost all forms of open ulceration in the tropics, whether it be chronic leg ulcers, wet wounds or throat infections of the ulcerative type termed Vincent's angina Fusiform bacilli are invariably found with them They also occur in sputum in ulcerative lung conditions, lung abscess and bronchiectasis Their relation to the ulceration is somewhat doubtful whether they be in some instances causative or only incidental commensals The Borrelia organisms of the relapsing fever group of diseases are about 21 microns in length, corresponding to the length of 3 red blood cell diameters They can be found easily in the peripheral blood of an infected patient, on dark ground illumination, during the first week of the illness, and can be detected when blood slides are stained by Giemsa's method

not of value in cases of Weil's disease or has a very limited effect The tetracycline group of drugs can be used with success in all these spirochætal diseases and are considered effective Caution must be exercised in treatment that these drugs are not given in large doses for an unduly prolonged time If they are administered for more than one week there is some risk of precipitating intestinal complications

As a late result of yaws infections, patients suffer from skin defects following ulceration Damage to the nasal cavities and face, particularly about the nose, is quite common Plastic surgical repairs are necessary in some cases Chronic invalidism caused by yaws in childhood predisposes to multiple contractures about joints, due to children being inadequately cared for and being allowed to remain bed-ridden Flexion deformities about the hips, knees and ankles require physiotherapy and in some cases tenotomies It should be realised that surgical procedures must be prefaced with adequate drug treatment of the basic infection before any operation is undertaken, otherwise the results of surgery will be disappointing This matter has been given some consideration in Chapter 19

FUNGUS INFECTIONS

Fungus infections in the human body give rise to a major group of diseases with many and varied clinical manifestations The classification of the various types of fungus is not yet determined with precision Doctors undertaking general medicine and surgery cannot be expected to become familiar with the various microscopic appearances of the many types to which long names are attached An Extract is appended in order to indicate the relative position of many of the fungi associated with well-known clinical conditions in the tropics Various forms of fungus occur naturally in soil They are nourished by the decomposition products of decaying vegetable matter, which they are dependent on for nutrition, being themselves incapable of synthesising elementary substances into foodstuffs as they do not contain chlorophyl A fungus is therefore essentially a parasitic growth, depending on higher forms of life for its nutrition and existence

Fungus diseases affect all parts of the body, superficial and deep This constitutes a very simple classification on clinical rather than biological grounds The superficial mycoses incorporate all forms of ringworm Most of these conditions can be treated with fair ease by local applications Iodine has held a deserved reputation for its efficiency in eradicating superficial mycoses

A surgical condition due to superficial mycosis is seen frequently in surgical clinics in the tropics in the form of ainhum, or ring toe (Fig 172) The pathology of this condition has caused much perplexity in the past It is now considered, with strong evidence to support it, that it is the late result of a chronic fungus infection about the crevices at the base of the toe in persons in the tropics who walk barefooted The condition is most common in the fifth toe and progressively less frequently seen on the toes more medially placed It is occasionally seen affecting the digits of the hand, particularly the fifth The condition has been seen on the hand personally on a few occasions only, it is not common The fungus damages the skin, secondary infection occurs, there is local deep-seated hyperæmia which causes osteoporosis of the first phalanx of the toe involved With progressive

is later removed from the tip of the mouse's tail and examined by dark ground illumination, in positive cases the treponema are found easily

In each spirochætal group there is a particular laboratory animal which is very susceptible to inoculation by the organism of the group In leptospirosis, guinea pigs are most suitable for growing the organism in the circulation In the Treponema group the organisms are more difficult to grow in animals Monkeys and rabbits are susceptible on cutaneous scarification and inoculation with infective material The *Spirillum minus* of rat bite fever can be grown with equal ease in any of the laboratory animals guinea pigs are considered the most suitable

The Treponema group of organisms do not give rise to such severe clinical manifestations of disease as is found in the leptospiral group of infections With syphilis and yaws there is a low grade constitutional disturbance, with slight fever, some lymphatic gland enlargement, and a variable skin rash and loss of weight The treponema of syphilis and yaws have the important characteristic that they invade the deep layers of the skin in the inflammatory reactions with which they are associated For this reason their identification is made easier, as non pathogenic spirochætes can be removed easily by washing away any surface contamination Any spirochætes then found on expression of serum from the deep tissues can be concluded to be of the syphilitic or yaws types On dark ground illumination examination *Treponema pallidum* gives a particularly pale appearance, as the name 'pallidum' implies, and this is sufficiently characteristic to identify it from other spirochætes of the same length The name *T pertenue* is given to the treponema causative of yaws, which is a particularly narrow organism, as the name indicates

In certain parts of the world, particularly the desert areas of the Middle East, Arabia and Syria, the condition of bejel is seen This condition is thought to be a non venereal form of syphilis It is caused by a spirochæte identical with *T pallidum* The lesions are found on any part of the body and are not necessarily about the genital areas The low rainfall and shortage of water in many areas is thought to predispose to the condition as a result of inadequate attention to personal hygiene Further identification of the various spirochætes can be undertaken by serological methods in the main centres, where the services of a trained pathologist are available

The treatment of the various forms of treponemal disease consists in adequate nursing and attention to local lesions if present in the febrile period and the use of specific therapy appropriate to the condition present Novarsenobenzol was used in the past with success in cases of rat bite fever The *Spirillum minus* is very susceptible to this arsenical preparation The blood stream can be cleared of the organisms quickly by its use Novarsenobenzol has been used extensively in the past in the treatment of syphilis and yaws Surface treponema in ulcerative conditions disappear with the use of novarsenobenzol in a high proportion of the cases, and if given in combination with sulpha drugs, chronic ulcers improve rapidly Novarsenobenzol is not effective in the treatment of Weil's disease It is dangerous in any patient suffering from jaundice because of the risk of aggravating liver damage in a patient whose liver is already implicated Following the use of penicillin there are few complications, and it has therefore largely replaced novarsenobenzol in treatment of treponemal conditions It is unfortunately

Pus discharges from multiple sinuses, and while some sinuses temporarily close and heal, new ones open The total number of sinuses present continues to increase There is a radiating spread of the pathological process in all directions There is a general increase in size of the part involved Gross disorganisation occurs with involvement of the bones and joints The patient hobbles about with slowly deteriorating general health

Abbott,[85] working in the Sudan, where he has had extensive experience of this condition, notes that in a series of 213 cases the distribution was as follows

Leg—168 Arm—19 Hand—14 Elsewhere—12

It is usual to get a history that the condition started at the site of a thorn injury some months earlier In some parts of Africa thorns are used by unqualified native practitioners for the suturing of wounds Cases have been reported where a mycetoma has followed this practice Laycock [86] noted a case of a fungus growth of the vulva following thorn suture after female circumcision Where mycetoma occurs about the scalp the history of a thorn injury occurring while passing under the branches of a thorn tree is not uncommon Hickey [87] reported three cases of maduromycosis of the frontal area of the scalp All layers were involved and the bone implicated Fungus was cultured from the material removed from each patient A history of having been hit by a stick was given in these cases

Fungi can be grown most easily on Sabourand s medium This is made up as follows

Peptone	1 0 per cent	Medium standardised to pH 5
Maltose	4 0 per cent	
Agar	2 3 per cent	

This material can be purchased in convenient tabloid form as a proprietary preparation under the name "mycological peptone," supplied by Oxo Ltd , London, E C 4

Considering all parts of the body and the very large number of possible fungus infections known, it is obvious that a great variety of clinical conditions will be produced Kirk and Morgan [88] have listed in general form the broad presentation of clinical manifestations which may be expected in patients who suffer from deep seated fungus infections

1 Acute pneumonia
2 Chronic pulmonary disease with cavitation like lung abscess
3 Discharging sinuses from deep tissues of any sort of chronic variety
4 Bone sinuses
5 Chronic discharging lymphatic glands like tuberculosis, or Hodgkin s disease
6 Fever associated with splenomegaly, leucopenia and rapid wasting
7 Alimentary disturbance going on a long time
8 Neurological disease like brain abscess of uncertain origin
9 Chronic skin ulceration
10 Erythema nodosum
11 Nasal polypus—in rhinosporidium
12 Progressive anæmia and leukæmia
13 Warty growth on the skin anywhere

bone decalcification, due to the hyperæmia, a pathological fracture occurs The deep-seated blood-vessels remain patent till a late stage, preserving the nutrition of the toe distal to the pathological constriction The patient ultimately seeks amputation of the toe because of pain Spontaneous amputation occurs at a late stage in untreated cases Before removing a ring toe the patient should be given a prophylactic dose of antitetanic serum It is extremely difficult to clean the painful area adequately

Any form of anæsthesia can be used for this operation The toe is removed without difficulty, using a bone forceps Following removal of the distal mass it is advisable to make a supralateral incision ½ in long through which the remains of the proximal phalanx of the implicated toe is disarticulated If this basal part of the phalanx is not removed, a sharp spur of bone remains at skin level, to remove this prevents further pain Following operation, the clefts between the other toes should be treated to remove possible infection by the causative fungus which may be present Ainhum sometimes affects two or three toes Men are more frequently affected than women Fungus infection of the nail beds of the fingers of the hands is best treated by avulsion of affected nails under anæsthesia and immediate application of a fungicide solution



FIG 172
Ainhum or ring toe, due to chronic infection with epidermophyton

Mossy foot is most frequently seen in the semi-arid areas of the tropics It is also due to an intradermal fungus infection Any one of four species may be found in it *Hormodendrum pedrosoi*, *H compactum*, *H acrotheca* or *Phialophora verrucosa* The foot is most commonly involved, but the same type of infection occurs rarely on the hands or about the face There is a piled-up papilliferous looking appearance of the skin of the foot which is well described by the term " mossy " Treatment will be considered later

There is little advantage in attempting to memorise the many forms of fungus associated with the various clinical manifestations of mycoses It is better to refer to a textbook, such as that written by Swartz on *Elements of Medical Mycology* If a fungus condition can be recognised by the presence of particles of mycelium or spores, that is all that is necessary Identification in detail is a matter for a trained pathologist or medical mycologist Most doctors working in the tropics are familiar with the condition of " Madura foot " This is the lesion which represents to them the best known form of deep fungus disease There is chronic thickening of the tissues, particularly about the ankle joint when the foot is involved

The eyepiece of the microscope can also be used or the low-powered objective Other methods suitably employed for the identification of fungus are biopsy of granulation tissue in the lesion and cultivation of discharges, using Sabourand's medium The fungus is slow-growing and takes twenty to thirty days to produce a moderate colony for further examination

The appearance of a fungus on culture differs somewhat from that found in the actual lesion itself This is not very unusual with cultural methods as noted with Leishmania In the body cells Leishmania are very small circular bodies with two nuclei deeply staining within them, but on culture the organism develops a terminal flagellum and looks very like a small trypanosome

Fungus conditions can be tested for by skin inoculation with fungus extracts Histoplasmin, as supplied by Ely Lilly of Indianapolis, was used by Collier and de La Fuente [93] They noted a positive skin test for histoplasmosis in the people of Dutch Guiana, varying between 13 8 and 53 7 per cent in different age groups This condition is very common in that part of the world As the fungoid conditions give rise to immune bodies it is possible to test for them by the method of fixation of complement, using known antigenic substances A fungus septicæmia is known to occur and fungus has been isolated on blood culture

Blood stream involvement probably accounts for metastatic brain lesions, as in torulosis There is usually a lung lesion with fungus disease present in cases where the brain ultimately becomes involved The association of brain abscess with bronchiectasis is well known The same method of blood transit of disease occurs in fungus pulmonary infection Gland puncture of enlarged glands adjacent to mycotic lesions sometimes shows a fungus to be present

Popular opinion suggests that fungus infections do not form secondary growths, but this conception is not personally held There is little doubt whatever that in some cases the adjacent lymphatic glands are involved Fig 173 shows a patient with a massive tumour of the right hand and forearm—Dr R W Kanzler's case The patient's arm was amputated but recurrence of a fungus like condition took place in the axilla The general microscopic appearances of tissue removed from mycotic lesions is that there is a generalised hyperplasia of connective tissue with hyaline degeneration present and an increase of vascularity The fungus may or may not be detected by the presence of mycelia or spore-like structures, depending on the type of the lesion In this case, however, no fungus could be found in the piece of tissue microscoped The patient subsequently improved following the use of intravenous pentamadine drugs

Fig 174 shows a microphotograph of a case of histoplasmosis from Ghana In West Africa cases of histoplasmosis are seen in small numbers but probably seldom recognised Unless a condition is suspected and looked for it can easily be overlooked

In cases where there is fungus disease involving lymphatic glands the clinical condition is very suggestive of tuberculosis or Hodgkin's disease Ashworth and Edington [94] reported a case of this type in the Gold Coast with bilateral cervical adenitis which on biopsy and microscopy showed mycosis fungoides The case was very resistant to treatment Moore [95] noted the much greater frequency of fungus infections about the foot than in the upper extremity He reported one

A very good practical working rule is to suspect fungus conditions if the cli manifestations are suggestive of tuberculosis, but no tubercle bacilli can be fo in specimens from the case, where they might reasonably be expected if it one of tuberculosis Fungus particles of mycelia or bulbous terminal segme as found in actinomycosis, termed "clubs," should be looked for in discharg from chronic sinuses of uncertain origin The low-power objective of t microscope should be used The mycelia are seen more easily if 20 per cer potassium hydroxide is added to the purulent material to be examined

Chang and Ch'ien [89] report the finding of *Cryptococcus neoformans*, a spore-lik infecting fungus in cerebrospinal fluid in a patient suffering from chronic headache The patient exhibited symptoms and signs suggestive of tuberculous meningitis, but no tubercle bacilli were found in the cerebrospinal fluid Cheng [90] also reported a case of Cryptococcus meningitis, with chronic headaches and ultimate unconsciousness The patient had Cryptococcus fungus in the sputum This fungus has a special predilection for the central nervous system The condition it gives rise to is sometimes called torulosis Villacorta and Resch [91] report a similar condition thought to have been precipitated by dissemination as a result of dental procedures Infection of the central nervous system in the form of torulosis is a very serious condition indeed Birsner and Smart [92] indicate the peculiar predisposition of coccidioidomycosis to affect bone locations In a series of eighteen cases noted the lesions were found in the extremities, the ribs and the bones of the face Histoplasmosis, a widespread fungus disease, affects particularly the cells of the reticulo-endothelial system This fungus, with the name *Histoplasma capsulatum*, is seen as apparently double-walled, spore-like particles of fungus within the tissue cells There is characteristically early splenic enlargement associated with it A tumour mass, splenic enlargement and rapid emaciation are three particular characteristics which are commonly found in this infective condition

In West Africa a large number of children are seen at surgical departments with all these features and in addition a fungus-like tumour involving one maxillary sinus or both On removal of tissue for section it has been reported as a "reticulo-endothelial condition of some sort, the nature of which is not obvious" It is very tempting indeed to consider that these may well be cases of histoplasmosis, and it is suggested that histoplasmosis should be looked for in these cases (Fig 276) The condition is unfortunately very common and fatal Chest X-ray, spleen puncture and sternal puncture for histoplasmosis should be undertaken in investigating these cases, specimens should be taken for microscopy and culture on Sabourand's medium Further reference will be made later to histoplasmosis, as it illustrates very well the general pattern of fungus infection of deep tissues

If particles of fungus cannot be detected in surface discharges it is helpful to ash the skin surface about the lesion and syringe out the deep sinuses with sterile ormal saline and collect the washings The material can then be concentrated centrifuging In infections of the human type of actinomyces, which is termed ocardia, coloured granules may be noted, these vary from pale yellow to red black The granules are of sufficient size to be seen through a strong hand lens

case of multiple chronic sinuses of arm due to mycetoma The nature of the condition was confirmed by microscopic examination The arm was amputated.

South American blastomycosis is a fungus condition where there is a lesion due to a fungus about the face, mouth and oropharynx The external lesions give an appearance in photographs somewhat similar to that seen in mossy foot in Africa, deep seated lesions also occur As with ulceration about any part of the body, *malignant changes are sometimes superimposed on ulcerative fungus disease* Bovine actinomycosis in the human subject tends to occur about the mouth with early involvement of the submaxillary cervical glands Pulmonary lesions are also seen and the walls of the cæcum are liable to develop the disease with abscess and sinus formation Actinomycosis of human origin as opposed to bovine is termed *Nocardia infection, clinically, it differs little from the bovine type* There are five types of Nocardia known, giving a different colour to the characteristic granules in each case, these being shades of yellow, red, brown or black

Histoplasmosis is a form of fungus infection which is very widespread in distribution throughout the world, it is seen more commonly in the tropics than *in temperate areas The various manifestations are being recognised with increasing* frequency in recent years Many small series have been recorded from widely different countries Skin testing by the use of histoplasmin indicates that the condition is both very widespread and very common, yet it is seldom recognised clinically In South and Central America the incidence appears to be particularly high Wildervanck, Collier and Winckel[96] *report cases from Central America* Vandepitte[9] reports a further case from Belgian Congo, bringing the total so far reported there to seventeen No doubt very many more have been seen but not reported in the literature Duncan[98] records a case from the Gold Coast Clarke, Walker and Winston[99] report cases of histoplasmosis from Africa with skin lesions looking a little like molluscum contagiosum Kalra and Borcar[100] reported cases from India Lindeboom *et al*[101] noted a case in Java while Li and Ping[102] describe a confirmed case from China, the infection, they think, may have been contracted in Singapore

Simons,[103] noting the lesions of histoplasmosis, mentions the following

1. *Nodules about lips and tongue, simulating cases of carcinoma*
2. Chronic punched-out ulcers about the tongue, particularly the sides
3. Mucous membranous granulomatous nodules about the nose, throat and *larynx*
4. Skin lesion looking very like molluscum contagiosum—face and groins
5. Lymphadenopathy very like Hodgkin's disease in appearance
6. Pulmonary lesions of various types, giving rise to X-ray changes
7. Intestinal granulomatous lesions throughout the length of the bowel
8. Chronic ulceration about the penis
9. Breast infiltration causing induration and enlargement

The condition is more common in *children than adults and is seen much* more frequently in male than female children Cases have been noted in cats, dogs and rats Biopsy and section is probably the best way of detecting the condition The histoplasmosis particles are a little like Leishman Donovan bodies

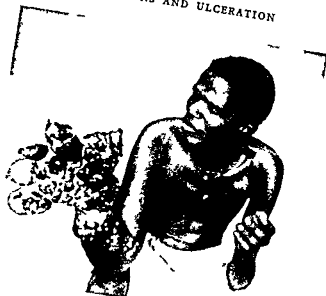


FIG 173
Fungoid tumour of right hand and forearm
Dr R W Kanzler's case

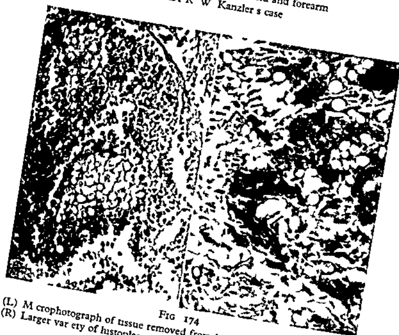


FIG 174
(L) Microphotograph of tissue removed from histoplasmosis case in Ghana
(R) Larger variety of histoplasmosis for comparison
By kind permission of Dr J Walker
×250

Histoplasmosis is obviously a condition which is very widespread in the tropics if skin testing is considered accurate, and it is thought to be so Davies,[108] describing a fatal case of histoplasmosis in a European child in Kenya, noted that the patient at post-mortem examination showed extensive bowel lesions, and there was also liver and splenic involvement Duncan [98] refers to a case in which the patient was invalided from the Gold Coast in 1939 suspected of having pulmonary tuberculosis, but no tubercle bacilli could ever be found in the sputum Some years later he developed skin lesions on the arms and legs and from these *Histoplasma capsulatum* was identified It is considered that the early pulmonary disease was almost certainly histoplasmosis of the pulmonary type contracted while employed as an underground mine worker

Dean [109] gives a most interesting account of histoplasmosis described as "cave disease," the illness resulting from infection contracted during exploration of caves, hence the appropriate name The following observations are made on the condition

1 Several cases of chesty illness occurred following cave exploration
2 The caves were heavily infected by bats and soiled by bat fæces
3 Onset of burning pain and pressure feeling in chest was experienced after cave visit
4 Many deaths noted following exploration of "haunted caves"
5 Cases all subsequently proved to be histoplasmosis by sputum and skin tests

It is now known that caves in many parts of the world predispose to contracting histoplasmosis primarily of the pulmonary type The conditions inside caves seem to be suited to the harbouring of fungus vegetation A list of infected cave areas is given to illustrate this point

Urungwe caves of South Africa —Histoplasmosis infections known following visits
Matapos caves in Rhodesia —Also said to be infected with histoplasmosis
Transvaal caves —Several cases of histoplasmosis reported following visits
Egyptian tomb caves —Have "Curse of Pharaoh," probably histoplasmosis
Venezuela caves —Known to be infected with histoplasmosis
Arkansas caves in U S A —Have produced many cases of histoplasmosis

The frequency with which pulmonary histoplasmosis has been noted following cave exploration is quite remarkable Murray *et al* [107] examined many persons keen on cave exploration (spelæologists) and found a 94 per cent positive skin histoplasmin test in those investigated The presence of bird and animal fæces

infection with a predisposition

It forms tumour-like lesions of the nasal polypus type On section of the infected tissue a large number of circular spore-like bodies can be found inside a single capsule or sporangium As the capsule ruptures, the disease is spread to adjacent parts by the dissemination of the liberated spores The condition is known in South America, it has also been reported by Purandare and Deoras [110] in India (Bombay area), who note

in appearance, but they are not nucleated They are found particularly w
reticulo endothelial cells Low-grade fever, rapid emaciation, loss of weight
splenic enlargement are general signs very suggestive of histoplasmosis Sil
and Konstam [104] reported a case from Nigeria There was a swelling of a
present and enlargement about the left knee due to abscess formation The pr
of rib was removed and the leg abscess was opened *Histoplasma capsulat*
was grown from both lesions

Winckel,[105] working in Central America where histoplasmosis is comparative
common, considered that a high proportion of menstrual disorders were due
endometrial involvement by histoplasmosis This has not been commented o
by other workers, but the observation is of interest Ways, Bryant and
Guichent [106] noted that an average of 35 per cent of the local people of Surinam
Dutch Guiana, gave a positive skin test with histoplasmin They considered that
the variety of histoplasmosis in that area of the world was of low grade and probably
a self-limiting disease in most cases, after a period of low-grade chronic ill health

Murray, Laurie and Brandt [107] describe five clinical varieties of the disease
as being

1 Progressive disseminated
2 Chronic cavitary pulmonary
3 Acute benign pulmonary
4 Asymptomatic—skin test positive only
5 Local ulcerative form

In the progressive disseminated type there is usually orolaryngeal ulceration with adenopathy, splenomegaly, hepatomegaly, pyrexia and anæmia In the chronic pulmonary variety the condition is very like pulmonary tuberculosis, but no tubercle bacilli can be found in the sputum There may be pulmonary cavitation The acute benign pulmonary form is also known as "cave disease" In the fourth variety there are no symptoms but there is a positive histoplasmin skin test In the final group there is superficial ulceration, the general health remains good

Collecting statistics of investigations as judged by the histoplasmin test the following figures have been compiled from various sources

	Per cent Positive	Source
South Africa	0 7 to 5 9	Murray
South Africa	35 0	Jores
Belgian Congo	17 8	Claesseus
Sudan	5 0	Edwards
Belgian Congo	10 8	de Vries
Eq Africa	10 8	Merveille
Uganda	6 3	Ball
Kenya	8 5	Stott
Egypt	nil	Mochi
Dutch Guiana	42 7	Collier
Liberia	18 1	Seides

of fungus conditions Where there is bone involvement, treatment of any sort is unlikely to be successful Any ill patient coping with infection is much improved by attention to general health

MacKinnon and others,[115] working in South America, have used several of the newer pentamidine drugs in the treatment of fungoid conditions They suggest the use of diaminodiphenylsulphone (for brevity, D D S), which is also called Dapsone and Avlosulfon, an Imperial Chemical Industries product still in the experimental stage (1958) MacKinnon considered sulphanilamide and sulphathiazol, tetracyclines and penicillin were all of some value in the actinomycotic type of conditions Stilbamidine isothionate (M & B 800) is also useful in many of the deep fungus conditions Abbott [85] recommended the use of diamidino-diphenylamine-dihydrochloride (M & B 938),* given intra-arterially, in doses of 25 to 50 mg depending on the weight of the patient He considered that the results were very promising but the existing structural damage cannot be repaired even though the lesions may heal Hydroxystilbamidine is an amidine drug by May & Baker which is supplied in ampoules of 250 mg for adult use and small doses for children Injections are given twice weekly for ten weeks, the total dosage for a course being from 5 to 10 gm This drug is active against a wide range of the fungus diseases, including blastomycotic dermatitis, histoplasmosis and cryptococcus infections of the central nervous system (torulosis) It is active against the Nocardia group, found as deep fungus infections It is also used in the protozoal blood infections, trypanosomiasis and leishmaniasis This group of drugs all cause a fall of blood-pressure when administered The low blood-pressure is associated with, if not caused by, a lowering of the blood sugar level Caution must therefore be exercised in their use This acute fall in blood-pressure was personally noted following experimental trials of 4-4 diamidinostilbene (Bowesman [116]), when an earlier member of this group of drugs was tested in cases of sleeping sickness Reiffeolsscheid and Seeliger [117] report treatment of cases of maduromycosis with 2′-2 dioxy 5′-5′ dichlordiphenyl sulphide, trade name "D 25," made by Boehrringer & Sohne, drug manufacturers of Mannheim, West Germany The drug is given by mouth, 6 gm daily There is also an oily preparation suitable for local injection into the lesions Local surgery may be required after the infection is controlled

These more recent drugs have not been used personally, but the information may be useful and suggest a line of treatment which is worth consideration as being the most recent information to date received from the three manufacturers concerned In view of the marked fall in blood sugar following the use of many of these drugs and the fact that most of the different types require a high sugar content in culture media suitable for their growth suggests that the lowering of blood sugar in the tissues may be an important factor in the arrest of these conditions

With these facts in mind, it is perhaps permissible to speculate a little on other possible means of producing a sustained hypoglycæmia of sufficient degree to be compatible with life and produce conditions unfavourable to the growth of fungus

* This compound is available for investigation purposes on special request from May & Baker Ltd, Dagenham, England

its marked preponderance in male patients, being 99 per cent, as opposed to 1 per cent in women Almost all lesions are noted about the upper respiratory tract The conjunctiva was implicated in a few cases The male urethra was the site of the disease in some cases Tjokronegoro,[111] working in Indonesia, noted the condition as a fungoid growth of the penis

The rhinosporidiosis masses, irrespective of their sites, are usually mistaken for carcinomata initially till sectioned and the nature of the tumour is ascertained It indicates the desirability of having all tumour tissue sectioned for confirmation of the diagnosis It is quite obvious that fungoid conditions give rise to many manifestations of disease for which a surgical opinion will be sought, and their significance and importance must be appreciated

The treatment of fungoid conditions is dealt with in general, rather than with reference to particular conditions which are so numerous Superficial fungus infections of the ringworm type have been treated with considerable success with iodine compounds Any abrasive ointment, such as Whitfield's salicylic and benzoic acid ointment, will remove much of the superficial growth Following removal of the ointment twelve hours later an application of 1 per cent biniodide of mercury in spirit may be used as this kills off the fungus in the deep skin layers Treatment should be continued for at least two weeks The treatment of all superficial fungus conditions is much more effective if surface hair is first shaved off the affected part As soon as the nature of the deep seated fungus diseases was appreciated iodine in various forms was tried, but with limited success in some cases and none in others Large doses of iodides produce iodism quickly, with sore throat and skin rashes The practice of giving 2 c c of tincture of iodine mitis, diluted to 10 c c with distilled sterile water intravenously, has been employed personally on many occasions No complications followed this method and in some cases there was marked improvement though in others none at all

With the introduction of sulpha drugs, they were tried enthusiastically but with disappointing results Secondary infections were improved, but the fungus remained unaltered in most cases Penicillin met with the same lack of success Singleton[112] reports benefit derived from giving very large doses of penicillin to a case of pelvic actinomycosis—24 mega units given over a period of sixty-three days He advocated the use of iodides, plus penicillin, plus surgery, as being most advantageous Penicillin, like sulpha drugs, clears up secondary infections Slade, Haseeb and Morgan[113] considered the tetracycline antibiotic drugs to be of some benefit in the maduromycotic conditions Intravenous typhoid antityphoid vaccine was considered to be of some value by reason of the marked pyrexia it produces

In a case of mossy foot, Yew[114] used a solution of a quarter per cent $CuSO_4$ as a foot bath and iodides by mouth and intravenously, this being followed by conspicuous improvement The fungus in mossy foot, *Hormodendrum acrotheca* in this case, is in the superficial layers of the skin, and local applications can be used with advantage Because of the irregularities of the surface, solutions are more likely to penetrate the interstices than are ointment preparations The use of copper salts in treatment is an interesting innovation and this report is therefore of value Application of exposures of X-rays do not afford benefit in the treatment

that minor trauma, due principally to fly-bites, is the initial cause of ulcers in a very high proportion of the cases in the Cameroons, West Africa Berry,[123] working in East Africa, expressed the same opinion following an extensive survey

Malnutrition and avitaminosis are contributory factors of considerable importance in the breakdown of surface tissues Charters [124] demonstrated a close relationship between the absence of milk in the diet and tropical ulcers, a community was divided into two equal parts and one section was deprived of fresh milk while the other was not there was a marked rise in the incidence of surface ulceration in those not receiving milk as opposed to the group that did receive milk Both groups otherwise lived under comparable conditions, so that an adequate assessment was possible Cancrum oris in children almost invariably occurs in those in poor nutritional condition

In the tropics the incidence of ulcers shows a conspicuous seasonal rise with the onset of the rainy season Two important contributory factors are probably concerned—there is a marked increase in flies at that time of the year and food stores are at a low level There is a degree of undernourishment in the population, it being six or eight months from the time of the previous harvest

Primary malignant disease is a comparatively rare cause of the superficial ulceration in the tropics Malignant disease superimposed on chronic ulceration in adults is more usual

The main types of infection in tropical ulcers are bacterial, protozoal, fungoidal and helminthic Guinea-worm disease, and to a much lesser extent schistosomiasis, are concerned In a small number of cases a solitary ulcer may show schistosome ova present on microscopy of biopsy specimens In a very high proportion of the cases the infection present is of bacterial origin as a primary cause Burnie,[125] giving his observations on tropical ulcers in the Kano area of Nigeria in 1931, considered 90 per cent to be of the tropical phagodenic type The amount of tropical ulceration seen in more recent years has markedly decreased, due to the improved Public Health Services and the use of the antibiotic drugs in treatment

Trophic ulcers of the neurogenic type are seen in association with leprosy, when there are usually other evidences of the disease present A chronic skin rash, more in the nature of a texture change, with a decrease of sweating locally and sensory changes are suggestive of leprosy and, if present, warrant investigation by examination of nasal mucous smears and biopsy specimens of abnormal skin taken for examination for leprosy bacilli There may be early thickening of peripheral nerves, particularly the ulnar, which can easily be felt in some cases Fig 175 shows a patient with leprosy who has a conspicuous thickening of the great auricular nerve present

Ulceration associated with fungoid infections frequently starts following stick or thorn injuries The infection is deep-seated and, as the parasitic growth increases, multiple skin lesions appear In the event of a local breakdown of tissue due to an infected fly-bite, which is followed by a generalised blood infection, there is usually a quiescent period of three to seven days, followed by a marked increase of inflammation at the site of the bite This is seen in the case of a trypanosomic chancre due to the bite of an infected tsetse fly It also occurs in cases of rat-bite

Whether a slow-acting insulin might not be given with advantage may not have been tried Rastinon tablets, a preparation given by mouth, also lowers blood sugar It is manufactured by Hoechst, West Germany An extract of *Lagerstromia speciosa*, a very pretty flowering tree in the tropics, is produced as a preparation called "Banabins," a Plantusul preparation, and this has a marked hypoglycæmic effect, it is manufactured by A T Sauco Inc, U S A Van Veen,[118] working in Indonesia, described an acid extract termed "Bongkrek acid," a new antibiotic, this acid is an extract of bacteria which grows on a fungus called *Rhizopus oryzæ*, which develops on the degeneration products of coco-nut This organic acid has two distinct actions It causes an acute hypoglycæmia and may cause death by this means It rapidly kills off fungus on which it grows as a contaminant This marked antibiotic effect on fungus might suggest that it could be used against fungoid conditions by local application at least Whether it could be used in any form internally without being too dangerous is a matter requiring investigation Further enquiries are being made about this

It is of interest to n
opposed to an extract of
or N
It i
are
by
were ... order to improve the
accu ... of neoplastic and fungus diseases

TROPICAL ULCERATION

External surface ulceration of the body constitutes a very serious problem in many parts of the tropical world The incidence varies greatly from place to place and at different seasons of the year Nelson and Semambo,[119] working in the West Nile district of Uganda, report an incidence of 1 to 2 per cent of tropical ulceration in the population These figures are usual for many rural areas of the tropics, much higher figures are given for some parts of India, but this is probably dependent on exceptional circumstances There are several basic factors involved in the process of ulceration—trauma, infection, malnutrition and neoplasia, all very important Each of these headings can be further subdivided
of African origin the influence of
examining patients with tropica
cent of the patients with trop ... the sickle cell trait, while the overall incidence of sickle cell trait in the population was only 18 per cent Those showing this sickle cell phenomenon run a very much greater risk of developing tropical ulceration than those without it

Trauma is an important factor in tropical ulceration, whether it be due to violent injury, insect bites of various types, abrasion by scratching with finger-nails or injuries by wires, thorns, sticks or stones Thompson[121] found that
ulcers amongst Hausa people in Northern N
predisposing factor in 63 per cent of

Central and West Africa Fain and Falaise[127] noted four cases in four months in the Ruanda-Urundi area of North-East Belgian Congo *Jelliffe*[128] *reported a* case from Nigeria Becker and Dorfman[129] noted a case of rhinoscleroma in South Africa and had the diagnosis confirmed by isolation of the bacillus of von Frisch from the lesions Vervoorn[130] reports a case of rhinoscleroma from Ghana It *is probable that the condition exists more widely in Africa than is at present* appreciated The appearances are very like those shown in Fig 165, this was a child from North-West Ghana The nature of the condition in this case was not confirmed microscopically Rhinoscleroma is thought by Kouwenaar,[131] who is probably the world authority on the subject, to be bacterial in origin

The constancy with which this Gram negative capsulated bacillus is associated with this ulcerative condition suggests that it is the causative agent This serious form of ulceration usually starts in children of about the age of 10 years, though it may be seen earlier in some cases It is commonest between 20 and 30 years of age Many members of the same family are often infected, suggesting that it is of an infective nature It tends to occur in rather undernourished people Barten[132] gives the incidence of the condition in Indonesia as high as 2 3 per cent in certain parts Some of the patients may be in the active stage of the disease, while others show the disease in the quiescent stage The importance of mentioning it here is that with the cases noted more recently in Africa it is likely that the condition is much more widespread than at present believed and might be looked for with advantage

Tuberculous ulcers are usually the result of breaking down of tuberculous glands, as seen most commonly about the cervical areas They are sometimes *associated with the axillary glands Such ulcers are an indication of deep seated* tuberculous disease

Coral contact ulcers have been reported in persons bathing in the sea off the East Coast of Africa There is a special characteristic about them, due to a poison *from the coral buds, which makes healing protracted A type of ulcer seen in* West Africa on a few occasions is that in which there is a chronic superficial skin defect about the skin of the anterior part of the neck and in addition a very chronic type of conjunctivitis, Parinaud s disease In each of these cases the condition was contracted on military service during the war in Burma, 1944 It was extremely resistant to all forms of treatment, and microscopy of biopsy specimens did not show any characteristic features to indicate the nature of the condition

Caution must be exercised that skin ulcers of amœbic origin are not overlooked, they are most commonly seen in female patients about the genital area They are usually small, multiple, with undercut edges, extremely painful [illegible] surface The causative

[illegible] en follow entry into the eye of foreign bodies which remain untreated and become grossly infected Poor nutrition predisposes to a rapid increase in size as infection is ill resisted They often heal with staphyloma formation and partial or complete loss of sight in the affected eye Corneal ulceration often occurs as a serious complication in children suffering from avitaminosis who contract measles

fever and in cases of plague This type of secondary flare-up of a bite area is strongly suggestive of a generalised infection having developed

Guinea-worm disease accounts for a large number of leg ulcer cases in parts of the tropical world where the people are dependent on shallow surface water supplies There is usually an extensive subcutaneous inflammatory area on the lower limb followed by penetration of the skin from within outward A water-blister appears about the ankle and is ruptured by scratching, there being marked irritation present The head of the parasite may then be seen protruding, as in Fig 94, soon secondary infection occurs and this small perforation increases in size Treatment of dracontiasis is considered in Chapter 30

There are many rare forms of ulceration in which the cause is not suspected when the case is first seen *Schistosoma hæmatobium* occasionally gives rise to



FIG 175



FIG 176

Fig 175—Patient with leprosy, showing visible thickening of great auricular nerve (L) Case of A J Hawe, F R C P

Fig 176—Chronic ulcer of right thigh due to metal foreign body in thigh

solitary skin ulceration occurring anywhere, but usually about the anogenital area in either male or female patients A deep-seated foreign body within the tissues for a prolonged time is sometimes the cause of a chronic ulcer, a piece of stick or metal being most usual Fig 176 shows a patient who had a splinter of metal in the right thigh for two years There was a persistent granulomatous mass protruding from an ulcer of the thigh The foreign body was removed from a large chronic abscess cavity

Rhinoscleroma is a form of ulceration causing destruction of the skin and cartilages of the nose, the cartilages of the larynx and trachea are also implicated It is generally believed to be due to *Klebsiella rhinoscleromatis* of von Frisch, though Ash and Spitz [126] are of the opinion that it is probably due to an associated virus The condition is seen in many parts of the world, particularly South-East Europe, mostly amongst Slavonic people, it also occurs in South America, India and particularly Indonesia Cases have more recently been reported from North,

These examinations require much time and skill if they are to be carried out properly The help of a trained pathologist is of enormous advantage Many of the examinations can, however, be carried out in country stations

Most patients with acute ulcers are in moderately good general health Where a chronic ulcer exists there is usually some good cause for the chronicity and the patient's health is often poor These cases require investigation The majority of ulcers occur in young persons under the age of 20 In this age group the syphilitic rate is very low, indeed there is therefore very slight danger in giving penicillin or tetracycline drugs which might mask the effect of a positive Kahn or Wassermann reaction blood test at a later time In chronic cases X-ray examination of the affected area should be undertaken to see if there is underlying bone involvement

In cases of ulceration due to leishmaniasis there may be enlargement of the spleen Splenic enlargement occurs with many conditions in the tropics, notably malaria in young people The spleen is also enlarged in fungoid conditions, particularly histoplasmosis Ulcer discharges are stained and examined using appropriate methods methyl violet (1 per cent) is best for Vincent's spirochætes Leishmann's stain is used for leishmania Gram's stain is suitable for most of the bacteria Chronic ulcers do not necessarily give rise to any leucocytosis if the pus is not under tension

In ulcer cases blood examination should be undertaken to test for sickle cells in African patients The possibility that thalassæmia predisposes to ulceration should be considered In view of the finding of a large number of cases of thalassæmia in Asia in recent years this form of examination is important Where ulceration is due to infections which have a special affinity for reticulo-endothelial tissue, sternal puncture and spleen puncture are useful forms of examination for the detection of infections such as leishmaniasis and histoplasmosis Examination of sputum is valuable where tuberculosis or fungus infections are suspected Animal inoculation with material removed from the surface of ulcers is not of great value because of gross contamination Biopsy and microscopy are of greatest value in cases of chronic ulceration Suspected malignant cases are also best confirmed by this means

If ulcers are multiple, it is suggestive of the cause being a general infection rather than local lesions Small ulcers caused by insects and acarids are extremely itchy They are usually noted about areas of soft skin in the genital areas The tick *Holothyrus coccinella* has been noted in some of these cases and identified Le Gac[133] notes ulceration following the bite of the flea *Cheapis muttah* There is often marked late keloid formation about the site of the bite of this insect

Bites about the eyelids or the scrotum of male children by ants give rise to marked œdema and a small necrotic ulcer at the site of the bite Chronic ulcers tend to be less painful than acute ulcers An exception to this is the chronic ulcer sometimes seen over the lower end of the fibula, which is often extremely painful The prevention of tropical ulcers is largely a matter of avoiding minor injuries and proper attention to cleanliness and general health

Efficient public health measures contribute most effectively to the reduction in the ulcer rate In many parts of the tropics, dairy farming is not undertaken

Acute ulcers starting in minor surface lesions are usually extremely itchy to start with The site of an ulcer may suggest its possible nature In guinea-worm ulcers the patient can describe the sinuous tract of the guinea-worm in the subcutaneous tissues Multiple ulcers of a chronic nature about the knees are not infrequently of treponemal origin Chronic ulcers about the forearm are sometimes seen in leishmaniasis cases Neck ulceration is often tuberculous The typical subacute phagodenic tropical ulcer is very characteristic in appearance It is associated with much local induration of the tissues and is most common about the lower parts of the leg There is a rapid increase in size and a mucopurulent hæmorrhagic discharge with a very offensive smell in these cases There is a characteristic purplish shade with greenish-grey necrotic patches about the base of the ulcer It is not a practical proposition to investigate all cases of tropical ulcer with academic precision The essential in treatment of patients is to get them well as quickly as possible by whatever means works best Appreciating that probably 90 per cent of tropical ulcers of the legs are of infective bacterial origin, superimposed on a minor trauma, it can be taken that they can practically all be treated efficiently with antibiotic drugs The tetracycline group is most efficient for this purpose It is advisable initially to treat all cases on clinical grounds alone If cases do not clear up completely or show very marked improvement within four weeks, they warrant full investigation Non-bacterial conditions which produce ulceration such as leishmaniasis, fungoid conditions and malignant disease are unaffected or little affected by the tetracycline drugs

The organisms thought to be causative of phagodenic tropical ulcer are usually considered to be *Borrelia vincenti* and fusiform bacilli These very large treponema of the 28 micron class can be found almost invariably in these lesions Whether they are contaminants only or primary pathogenic agents is somewhat in doubt

The appearance of a phagodenic ulcer and its acute tenderness and slimy surface are all characteristics which simulate very closely the findings in amœboma of the rectum It is tempting to think that tropical phagodenic ulcers might be of protozeal origin, but it is considered by most authorities that protozoa of the amœbic group do not cause this condition Contrary, however, to this opinion, amœbæ have been found in these ulcers personally on a few occasions The possibility that the mucous-like discharge may be produced by the presence of the *Treponema mucosum* of the 7 to 14 micron class might be considered Diphtheroid bacilli are found rarely in tropical ulcers giving rise to the veldt sore type, more usually of the small indolent sort (Fig 170)

Investigation of ulcers may be along several lines The following approaches are suggested

1 Microscopy of local discharges
2 Gland puncture of adjacent glands
3 Blood examinations of various sorts
4 Reticulo-endothelial investigation
5 Urine examination for schistosomes
6 Sputum examination for fungi and tubercle bacilli
7 Biological inoculations of laboratory animals
8 Biopsy of tissue from the ulcer edge

they may not always be available, particularly in small country hospitals privately financed, where economy is a prime controlling factor in management Much good work can be undertaken without antibiotic drugs being available, desirable though they be

Appreciating these circumstances some suggestions are made from methods noted personally The application of chemicals such as eusol give fair results at a low cost in cases which are not too serious Chemical solutions are frequently wasted by putting large quantities on to dressings The maximum effect with the minimum of wastage can be obtained if antiseptics are applied by the "spray" method, a dressing is then applied Powdered sulpha drugs can also be used in this way with a powder insufflator Novarsenobenzol can also be used in spray form locally on ulcers and gives very good results

Schwendler[131] treated chronic leg ulcers with remarkable success by the simple application of fine granulated sugar followed by a dressing once daily for a week The patient was kept at rest in bed with a splint on. The ulcer is in almost all cases extremely clean after treatment in this way for seven days A result equally good was noted as that achieved by the use of large doses of penicillin After the ulcer is clean a zinc-gloy dressing is applied (Unna's paste) direct on the ulcer with a bandage incorporated No penicillin at all was given in these cases This inexpensive method of cleaning ulcers is worthy of note considering the availability of sugar where penicillin may be unobtainable Bacteria are much influenced by the pH of local tissues, and in some cases if an ulcer is slow in healing a remarkable improvement may be obtained by covering the ulcer completely with sodium bicarbonate for forty-eight hours This method was used with conspicuous success in the case of infected war casualties in Warsaw where medical supplies were not available due to siege Sodium bicarbonate can usually be purchased easily, as it is used for domestic purposes

Wilson[132] considers the best method of treating the minor trauma of fly bites, which is the starting point of many ulcers, is by using "ZIPPO" (Zinc, Iodiform and Paraffin Paste with the addition of "O" for palm oil) To alter the temperature of a limb often causes a considerable improvement With this in view, three methods can be employed to achieve this end Gorecki,[135] working in the Belgian Congo, advocated curettage of the ulcer, local application of penicillin, Unna's paste boot dressing and twice-weekly injection of lumbar sympathetic ganglia using 1 per cent solution of novocain He considered the results very good This method is, however, rather time-consuming, as the injections are given twice-weekly for a month Long-acting spinal anæsthesia given on two or three occasions within two weeks has also been advocated Following spinal anæsthesia there is a temporary rise in the temperature of the limbs This method has been tried personally but it was not found as effective as claimed by those who introduced it

Unilateral lumbar sympathectomy is the third method which is suitable for very chronic cases Although necessitating an operation, it produces a prolonged raising of the temperature of the leg Fig 178 shows a patient for whom this procedure was undertaken The ganglia are approached by the extraperitoneal route The interruption of the autonomic vascular control in the leg causes

by the local people and they do not drink fresh milk, they are, therefore, deprived of the nutritional advantages of this form of diet In areas where the rainfall is low and the country becomes arid, citrus fruits are difficult to grow Lack of vitamin C predisposes to unhealthy skin and scurvy As many citrus trees are lost from lack of care the method of root watering is a great advantage in preserving fruit trees in areas of low rainfall It is advisable to give school children citrus fruit This point is considered worth mentioning in a surgical book in view of its bearing on the ulcer problem The young tree is planted in a well-manured and prepared soil to which calcium in the form of dried bones is added The area surrounding the tree is concreted over for a radius of 6 ft, a small circle only is allowed for the stem to come through (Fig 177) About

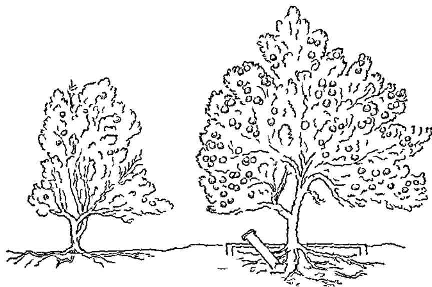


Fig 177
Diagram of root watering of citrus tree in dry country

2 ft away from the tree a wide bore metal pipe is put through the concrete and fixed in position The pipe is covered with a metal cap, through this opening a large quantity of water can be introduced once daily By this means the tree can be well watered and adequate fluid reaches the roots without loss by evaporation from the surface around the tree If concrete is not used and water is thrown on the surface of the ground about a young tree, it is not absorbed through the hard caked earth and dries away quickly in a hot climate

In treatment of tropical ulcers there have been many approaches Some of the methods depend on the advantage gained by altering the physical conditions about the location of the ulcer, with special reference to light, temperature, humidity, electrical charge, hydrogen ion concentration, osmotic pressure and chemical content Whereas tetracycline antibiotic drugs and intravenous arsenical preparations are probably the most effective means of clearing up tropical ulcers

If in chronic ulcer cases affecting the legs there is underlying bone erosion and rarefaction, healing is likely to be slow and unsatisfactory In chronic cases there is a high risk of malignancy developing in African patients In chronic ulcer cases with deterioration in general health and a renal degenerative change, amyloid disease, or in more modern terms, nephrosis, it is best to amputate the leg at the mid-thigh position *Amputation is also indicated if a pathological fracture occurs* Fig 179 shows a patient who lost a leg spontaneously as a result of a chronic ulcer with pathological fracture He did not receive any treatment at hospital



Fig 179
Spontaneous amputation of the leg due to chronic ulceration

If a patient suffers from a chronic ulcer involving the tendo achillis, it may heal with treatment, but there is almost invariably a severe equinus deformity produced Treatment of these cases is difficult The most satisfactory procedure found from personal experience is in advanced cases to excise the tendo achillis completely This would appear to be a very drastic method of dealing with the condition, but the results are good, permitting of the patient getting the heel to the ground, and the remaining tendons going round the back of the ankle joint are sufficient to permit of the patient re-establishing reasonably good foot function This operation is not as damaging as it would appear to be and *the patient is much benefited by it* An incision lateral to the tendon is used for its removal It is advisable to give the patient a course of penicillin prior to the operation as the tissues may be in a poor state with some infection *still* residual in the deep tissues Care must be exercised not to damage the blood-vessels near by as they proceed to the foot

McFadzean and Tsang,[137] working in Hong Kong, noted that in patients who developed pigmented areas about the legs below the knee which were subsequently followed by ulceration of a chronic form, the cases were greatly benefited by splenectomy Following this operation the ulcers healed quite quickly The precise *cause of this pigmentation* and ulceration and the rationale of the treatment are ~ ad The res ilts will be of considerable interest Cases of this
urned out to be associated with thrombo-
le to an overacting spleen or hypersplenism
—splenectomy is therefore beneficial *This type of ulceration is not very common* in West Africa It cannot be detected easily except in those patients with very light-brown skin

a prolonged rise of temperature of the limb and increased blood supply for two three months After this time it seems to return to the same temperature as th other leg in spite of the ganglia being removed The increased temperature c the leg and the improved blood supply of the skin decreases infection and promote healing The method is very valuable in chronic cases, especially in older adults

Safronov[136] reported good results in the healing of ulcers following cleaning of the ulcer bed by high-pressure suction with an electric suction pump locally applied to the necrotic surface A local anæsthetic was given round the site of the ulcer before the procedure was undertaken This method amounts virtually to a form of curettage, taking away all the necrotic tissue by electric suction, with removal of the minimum of live cells Following suction there is a slow oozing

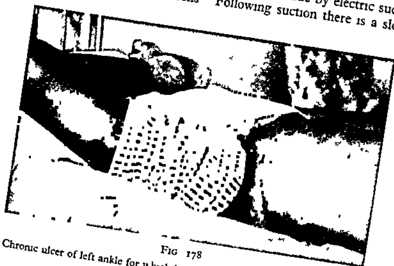


Fig 178

Chronic ulcer of left ankle for which lumbar sympathectomy was performed

of serum and blood A firm bandage is applied over the layer of blood direct on the ulcer The method is an interesting innovation

The method of Nelson and Semambo,[119] working in Uganda, has received vide and popular approval, 1 c c of penicillin aluminium monostearate (300,000 nits per c c) is given daily for a week The ulcer during this time is covered with dry dressing Under spinal anæsthesia an Esmarch's tourniquet is then plied and the ulcer cleaned with cetavlon and excised The ulcer is immediately n-grafted by the Thiersch method A vaseline gauze is applied for a week lowing the operation; lint, wool and a crepe bandage maintain the pressure r the dressing The penicillin PAM is continued daily during the week owing operation Ninety per cent of the skin grafts took well and the rs were completely healed in four weeks The total quantity of penicillin was 0,000 units, which is quite a large dose Kanzler, working in Ghana, has ed many tropical ulcers successfully with skin of the prepuce following mcision (Fig 130) This method has been well accepted by the population

Dermatomycoses constitute the group of superficial ringworms Diagrams are given to indicate roughly the appearance of the fungus as seen in the clinical lesions The appearances vary greatly between the fungus as found in the disease entity and as noted on culture Identification is *finalised by cultural methods* Photographs of pure cultures of the various types of fungus can be found in books on medical mycology It should be appreciated that fungus may be of the mycelial form or in the yeast form with almost circular particles Histoplasmosis is characteristically a reticulocytomycosis Histoplasmosis may occur in a large or small form, the appearances differ very considerably

Books also recommended "Manual of Clinical Mycology," Conant *et al*, W B Saunders, London, 1954 "An Introduction to Medical Mycology," Lewis *et al*, The Year Book Publishers, Chicago, 1958

REFERENCES

1 HIRAOKA, T (1957) A study of toxoplasmosis *Kyûshû J med Sci* 8, 41
2 HIRAOKA, T (1958) A study of toxoplasmosis *Kyûshû J med Sci* 9, 22
3 RAWAL, B D & PATAL, R J (1956) Ocular toxoplasmosis *Indian J med Sci* 10, 55
4 LAINSON, R (1958) *Observations on the development and nature of pseudo-cysts and cysts of Toxoplasma gondii* *Trans roy Soc trop Med Hyg* 52, 396
5 GIBSON, C L & EYLES, D E (1957) Toxoplasmosis infections in animals associated with case of human congenital toxoplasmosis *Amer J trop Med Hyg* 6, 990
6 BONNET, H DE R (1957) *Toxoplasmosis in slaughter cattle, particularly sheep* *Docum Med geogr trop (Amst)*, 9, 336
7 SABIN, A B & FELDMAN, H A (1948) Dyes as microchemical indicators of a new immunity phenomenon affecting a protozan parasite—toxoplasma *Science*, 108, 660
8 AWAD, F I (1954) *A new dye test for toxoplasmosis and sarcocystis infections by use of Sarcocystis tenella* spores *Trans roy Soc trop Med Hyg* 48, 337
9 GIBSON, C L & COLEMAN, N (1958) Prevalence of toxoplasmosis antibodies in Guatemala and Costa Rica *Amer J trop Med Hyg* 7, 334
10 SCHMIDKE, L (1957) Examination of amniotic fluid for toxoplasmosis *German med Month* 2, 279
11 GARCIA, E Y (1950) Toxoplasmosis and sparganosis in native Filipinos *J Philipp med Ass* 26, 225
12 HEWSON, G E (1956) Toxoplasmosis *Irish J med Sci* p 259
13 RUBIN, M L (1958) Studies on toxoplasmosis *Amer J trop Med Hyg* 7, 358
14 KOBERLE, F (1958) Megacolon *J trop Med Hyg* 61, 21
15 AKWEI, E (1952) Planning the control of sleeping sickness *Trans roy Soc trop Med Hyg* 46, 437
16 HEISCH, R B (1958) On *Leishmania adleri*, sp nov from Lacertia lizards in Kenya *Ann trop Med Parasit* 52, 68
17 HEISCH, R B (1954) Studies on leishmaniasis in East Africa *Trans roy Soc trop Med Hyg* 48, 449
18 ROBINSON, G, COLES, A C E & COSGROVE, P C (1942 43) A preliminary report on an outbreak of kala-azar in a battalion of King's African Rifles *Trans roy Soc trop Med Hyg* 36, 25
19 WALTERS, J H (1949) *A case of indigenous kala-azar in the Gambia* *Trans roy Soc trop Med Hyg* 43, 287
20 REDDY, D G (1945) A new technique of sternal puncture *Indian med Gaz* 80, 502
21 New China's achievement in the treatment and prevention of kala azar
22 TSAO, Y-P (1951) Stilbamidine in the treatment 171
23 ry observations in treatment of Chinese kala-azar with pentamidine isothionate *Chin med J* 69, 160
24 MANSON-BAHR, P E C (1957) Leishmaniasis south of the Sahara *Cent Afr J Med* 3, 189
25 ROLLINSON, D H L (1956) Problem of rabies control in Africa *E Afr med J* 33, 425
26 CHRISTIE, G J (1956) Rabies *Cent Afr J Med* 2, 285
27 AHUJA, M L (1958) Rabies in India *J trop Med Hyg* 61, 95
28 FENDALL, N R E (1950) Two cases of hydrophobia *E Afr med J* 27, 167
29 SAVAGE, R G A (1934) A case of human rabies *W Afr med J* 7, 125

EXTRACTS

1 Identification of pathogenic and non pathogenic treponema

Group	Size	Microns	Site Found	Disease Caused	Organisms
Borrelia	4 R B C	28	Body surfaces	Ulceration	*B refringens* *B vincenti*
Borrelia	3 R B C	21	Blood stream	Relapsing fever	*B obermeiers* *B duttoni*
Leptospira	2 R B C	14	Blood stream	Weil s disease	*L icterohæmorrhagi e*
Treponema	2 R.B C	14	Deep skin	Syphilis and yaws	*T pallidum* *T pertenue*
Treponema	2 R B C	14	Genital secretions	Non pathogenic	*T calligyrum* *T minutum*
Spirillum min us	1 R.B C	7	Blood stream	Rat bite fever	*S min us*

2 Fungus disease groups

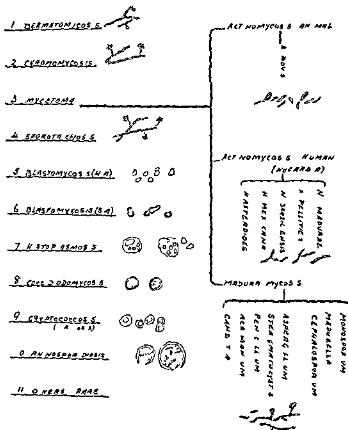


FIG 180
D agram of fungus diseases giving names and appearances

72 ROBINSON, G (1936) Official Records—Medical Research Institute Accra
73 MANSON-BAHR, P E C (1956) Clinical aspects of brucellosis in East Africa *J trop Med Hyg* 59, 103
74 MATHER, T N (1955) Hepatitis in brucellosis *Indian J med Sci* 9, 57
75 SPINK, W G, MCCULLOUGH, N B *et al* (1952) Diagnostic criteria of human brucellosis *J Amer med Ass* 149 (1), 805
76 HONEY, R M & GELFAND, M (1957) Chronic brucella pyelonephritis with calcification. *Cent Afr J Med* 3 465
77 JONES, R TREVOR (1955) A brief survey of the orthopædic aspects of brucellosis in Central Africa *Cent Afr J Med* 1, 16
78 MANTLE, J A (1955) Brucellosis spondylitis *J Bone Jt Surg* 37 B, 456
79 RALSTON, R J (1950) Treatment of chronic brucellosis with chloramphenicol and aureomycin *J trop Med Hyg* 53 117
80 SANCHEZ, F R *et al* (1955) Treatment of brucellosis with tetracycline *Antibiot Med Brit Ed* 1, 158
81 WOSFOLD, J T (1955) Outbreak of plague at Chilokoloki, N Rhodesia *Cent Afr J Med* 1, 116
82 HOEKENGA, M T (1947) Plague in the Americas *J trop Med Hyg* 50, 190
83 CHENG, R T S (1949) Streptomycin in bubonic plague *Chin med J* 67, 443
84 FENG, T H (1949) Primary pneumococcal plague with recovery *Chin med J* 67, 547
85 ABBOTT, P (1956) Mycetoma in the Sudan *Trans roy Soc trop Med Hyg* 50, 11
86 LAYCOCK, H T (1950) Surgical aspects of female circumcision in Somaliland *E Afr med J* 27, 445
87 HICKEY, B B (1956) Cranial maduromycosis *Trans roy Soc trop Med Hyg* 50, 393
88 KIRK, R & MORGAN, H V (1958) The systemic mycosis *J trop Med Hyg* 61, 215
89 CHANG, T E & CHIEN, W F (1956) Torula meningitis *Chin med J* 74 160
90 CHENG, W F (1956) Cryptococcosis *Chin med J* 74 374
91 VILLACORTA, M G & RESCH, C A (1954) Torulosis aggravated by dental procedures *J Philipp med Ass* 30, 651
92 BIRSNER, J W & SMART, S (1956) Ossius coccidiomycosis *Amer J Roentgenol* 76, 1052
93 COLLIER, W A & LA FUENTE, A DE (1953) The histoplasmin test in Surinam *Docum Med geogr trop (Amst)*, 5, 103
94 ASHWORTH, F & EDINGTON, G M (1954) Mycosis fungoides in a Gold Coast African *W Afr med J* 3 150
95 MOORE, M (1954) Mycetoma of hand and arm caused by madurella *Amer J trop Med Hyg* 3, 303
96 WILDERVANCK, A, COLLIER, A & WINCKEL, W (1953) Two cases of histoplasmosis on farms near Paramaribo *Docum Med geogr Trop (Amst)*, 5, 108
97 VANDEPITTE, J *et al* (1957) Deuxieme cas congolaise d histoplasmose *Ann Soc belge Med trop* 37, 515
98 DUNCAN, J T (1958) Tropical African histoplasmosis *Trans roy Soc trop Med Hyg* 52, 468
99 CLARKE, G H V, WALKER, J & WINSTON, R M (1953) African histoplasmosis *J trop Med Hyg* 56, 277
100 KALRA, S & BORCAR, M D (1957) Histoplasmosis—isolation of the fungus from soil and man *Indian J med Sci* 11, 496
101 LINDEBOOM, G A, HOOGENDIJK, J L & HOOGENDIJK VAN DORT, T J E (1956) Histoplasmosis in Java *Docum Med geogr trop (Amst)*, 8, 327
102 LI, Y C & PING, C (1958) Histoplasmosis *Chin med J* 77, 148
103 SIMONS, R D G (1953) Histoplasmosis *Handbook of Tropical Dermatology*, 2, 1318 Amsterdam Elsevier
104 SILVERA, W D & KONSTAM, P G (1954) A case of histoplasma duboisii infection *W Afr med J* 3, 32
105 WINCKEL, W (1953) Histoplasmosis findings in menstrual disturbances *Docum med geogr trop (Amst)*, 5, 215
106 WAYS, P, BRYANT, J & GUICHERIT, I D (1956) Histoplasmosis sensitivity amongst the bush negroes of Surinam *Docum Med geogr trop (Amst)*, 8 383
107 MURRAY, J F, LAURIE, H I & BRANDT, F A (1958) Histoplasmosis in Africa *J trop Med Hyg* 61, 124
108 DAVIES, P (1957) A fatal case of histoplasmosis contracted in Kenya *E Afr med J* 34, 555

30 TAYLOR, E (1958) A human case of rabies with short incubation period *Cent Afr J Med* 4, 170
31 MARTINEZ, L D (1956) Rabies in the Philippines *J Philipp med Ass* 32, 365
32 FRYER, S V (1934) Rapid method of diagnosis of rabies in urgent cases *W Afr med J* 8, 15
33 KHEMANI, K M (1959) The importance of biological tests for rabies *Indian J med Sci* 13, 17
34 KOVAC, T (1953) Rabies in Beska, Yugoslavia *Med Rev Serb med Ass* 6, 381
35 MCFADZEAN, A J S & CHAO, C H (1953) The neuroparalytic accidents of antirabies vaccination *Trans roy Soc trop Med Hyg* 47, 372
36 BALTAZARD, M & BAHMANYAR, M (1955) Essai practique du serum antirabic *Bull Wld Hlth Org* 13, 747
37 DOGRA, J R (1950) Studies on antirabies vaccine *Indian J med Sci* 4, 323
38 BOULGER, L R & CANNON, D A (1954) The effects of temperature on the keeping properties of antirabies vaccine at Yaba, Nigeria *W Afr med J* 3, 162
39 The Editor (1959) Rabies immunisation *J Amer med Ass* 169 (1), 417
40 NEHAUL, B (1955) Rabies transmitted by bats in British Guiana *Amer J trop Med Hyg* 4, 550
41 CROOT, H J (1952) Tetanus—Proceedings Mulago Medical Society *E Afr med J* 29, 482
42 SLOME, R (1954) Tetanus in South Africa *S Afr med J* 28 (1), 473
43 STEPHENS, J R (1931) Tetanus in dust *W Afr med J* 4, 97
44 THOMAS, O (1956) Editorial—Treating tetanus *W Afr med J* 5, 141
45 [illegible] ology of tetanus *Khirurgyia (U S S R)*, 9, 80
[illegible] in bite wounds *Med Rev Serb med Ass* 6, 426
[illegible] *ical Diseases*, ed R P Strong, 7th ed, vol ii, p 1609
48 SHAH, N J (1955) Study of otogenic tetanus *Indian J med Sci* 9, 52
49 DAVE, B T (1955) Puerperium and its complications *Postgrad Med (Bombay)*, 1, 14
50 VERVOORN, J D (1958) Active tetanus immunisation in Ashanti Ghana *Trop geogr Med*, 10, 277
51 KIRKPATRICK, C R (1956) Tetanus treated by muscle relaxants and intermittent positive [illegible]
[illegible] 67, 639
[illegible] h recovery *Chin med J* 68, 512
[illegible] *Practical Bacteriology*, 9th ed rept,
[illegible] *Cent Afr J Med* 1, 216
[illegible] chlorpromazine (largactil), A.T S
[illegible] neonatorum *Amer J trop Med* [illegible]
58 LEWIS, R A *et al* (1954) Corticotropin (ACTH) in severe tetanus *Indian J med Sci* 8, 1
59 KERR, W G (1944) Clinical notes—anthrax of larynx *E Afr med J* 21, 93
60 MAVROS, P (1955) A clinical note on an outbreak of cutaneous anthrax in Lundi Native Reserve *Cent Afr J Med* 1, 76
61 BROWNE, M P, HOLDEN, J R & HUTCHINSON, J (1958) Personal communications Anthrax epidemic in Gold Coast, 1942
62 RAPER, A B (1953) Anthrax meningo encephalitis *E Afr med J* 30, 399
63 CARMICHAEL, J (1952) Animal man relationship in tropical diseases in Africa *Trans roy Soc trop Med Hyg* 46, 385
64 Pan American Sanitary Bureau (1931) Diphtheria in the tropics Publication No 46 Washington, D C
65 ALEXANDER, G L (1957) Tracheo bronchitis with laryngeal obstruction Personal communication Ghana
66 TURNBULL, N S (1949) Diphtheria in African natives of Transkei *Trans roy Soc trop Med Hyg* 43, 215
67 WILKINS, A J W (1958) Diphtheria in the African *Cent Afr J Med* 4, 396
68 GELFAND, M (1957) *The Sick African*, 3rd ed p 74 Cape Town Juta.
69 RIBEIRO, A L (1953) The uvula and East African negroes *E Afr med J* 30, 393
70 HODSON, R & STEWART, I S (1950) Diphtheria in South Persia *Brit med J* 1, 1238
71 HUGHES, M (1955) Zoonoses in the Gold Coast *Proc W Afr Sci Ass* p 91.

19

Plastic Surgery

GENERAL PRINCIPLES

THE term plastic surgery implies reconstructive or *reparative surgery for the* purpose of remoulding body structures by special calculated operative procedures of suturing, grafting or transference of tissues All branches of surgery have a reparative aspect in as far as it is necessary to close a surface wound in most cases Some conditions which might be classed under plastic surgery have already been dealt with, such as genito-urinary fistulæ, circumcision and certain herniæ It is uncomfortable and disabling to have a wound of any sort which interferes with the normal activity of the individual If a scar is not actually visible about the body, peculiarity of movement due to restrictive scarring may cause abnormal body action to a sufficient extent to suggest that the individual is not normal in his physique It is of paramount importance that following operations there should be a neat, well-placed scar causing minimal disability or disfigurement Visible disfigurement is a serious factor, interfering with social and economic success In many parts of the tropical world the stigma of congenital malformation is considered so detrimental to status that great efforts are made to conceal congenital deformity Early efforts are usually made to have the disfigurement dealt with by surgery (Fig 181)

To obtain satisfactory repair of any wound the incision must be closed with the minimum of tension in the skin edges involved All layers deep to the surface must be accurately and securely approximated, and the wound must be free from sepsis It is most important that the underlying as well as the superficial layers should be accurately apposed Hæmostasis must be adequate in all layers In limb surgery exsanguinating rubber tourniquets of the Esmarch type should be used where practicable Where tourniquets cannot be used, the routine use of injection of adrenaline 1 in 400,000 to 1 in 200,000 in water in the area of surgical *incisions is an enormous advantage* The weaker solution is advised as being sufficient to arrest bleeding from small vessels The larger vessels, which bleed to a small extent, must be ligated accurately This technique is very valuable in areas such as the abdomen, chest and neck Blood loss is greatly reduced by the *proper use of posture Hypotensive drugs* such as hexamethonium iodide and others are valuable, but should be used only when a trained anæsthetist is available to administer and control them If during the operation of amputation of an elephantoid scrotum the patient's legs are allowed to hang over the edges of the table in the abducted position much blood is "pooled" in the lower limbs If in addition to this posturing an injection of adrenaline in water 1 in 400,000 is given into the inguinal and prepubic areas and around the base of the scrotum

109 DEAN, G (1957) Cave disease *Cent Afr J Med* 3, 79

110 PURANDARE, N M & DEORAS, S M (1953) Rhinosporidiosis in Bombay *Indian J m Sci* 7, 603

111 TJOKRONEGORO, S (1955) A case of penile rhinosporidiosis in Indonesia *Docum med geo trop (Amst)*, 7, 113

112 SINGLETON, B (1950) Penicillin in treatment of pelvic actinomycosis *E Afr med J* 27, 20

113 SLADE, P R, HASEEB, M A & MORGAN, H V (1956) Oxytetracycline in treatment maduromycosis *J trop Med Hyg* 59, 262

114 YEW, C-C. (1951) Chromoblastomycosis *Chin med J* 69, 476

115 MACKINNON, J E (1958) Inhibitory effects of chemotherapeutic agents on mycetomas and nocardiosis *Trans roy Soc trop Med Hyg* 52, 78

116 BOWESMAN, C (1940) 4-4 diamidino stilbene in treatment of human sleeping sickness *Ann trop Med Parasit* 34, 217

117 REIFFEOLSSCHEID, M (1957) Monosporosis and maduromycosis *German med Monthly* 2, 139

118 VAN VEEN, A G (1950) Bongkrek acid, a new antibiotic *Docum neerl indones Morb trop* 2, 185

119 NELSON, G S & SEMAMBO, Y B (1956) Treatment of tropical ulcers *E Afr med J* 33, 189

120 ABBOTT, P H (1950) The sickle cell trait among the Zandi tribe of S Sudan *E Afr med J* 27, 162

121 THOMPSON, I G (1956) Tropical ulcer amongst the Hausa people of Northern Nigeria *Trans roy Soc trop Med Hyg* 50, 485

122 WILSON, C (1957) Tropical ulcer amongst Hausas *Trans roy Soc trop Med Hyg* 51, 91

123 BERRY, W T C (1956) The riddle of tropical phagodenic ulcer *E Afr med J* 33, 88

124 CHARTERS, A D (1947) The etiology of tropical ulcers in Somalis *J trop Med Hyg* 50, 22

125 BURNIE, R M (1931) Observations on tropical ulcers *W Afr med J* 4, 77

126 ASH, J E & SPITZ, S (1945) *Pathology of Tropical Disease*, p 14 Philadelphia & London Saunders

127 FAIN, A & FALAISE, A (1957) Apropos du rhinosclerome au Ruanda-Urundi *Ann Soc belge Méd trop* 37, 67

128 JELLIFFE, D B (1952) Rhinoscleroma in a Nigerian male *W Afr med J* 1, 122

129 BECKER, B J P & DORFMAN, R F (1956) A case of rhinoscleroma in South Africa *S Afr med J* 30, (i), 581

130 VERVOORN, J D (1959) A case of rhinoscleroma in Ghana *Trop & Geographical Med (Amst)*, 11, 182

131 KOUWENAAR, W (1956) Rhinoscleroma *Docum med geogr trop (Amst)* 8, 13

132 BARTEN, J J C (1956) Scleroma respiratorium in Indonesia *Docum med geogr trop (Amst)*, 8, 101

133 LE GAC, P (1953) Research on rickettsia pox in Ongangui Chari *W Afr med* 2, 42

134 SCHWENDLER, H P (1957) Treatment of ulcers with sugar Personal communication, Ghana

135 GORECKI, P (1957) Contribution au traitment des ulcers phagodenique *Ann Soc belge Méd trop* 37, 263

136 SAFRONOV, A A (1957) Treatment of trophic ulcers of lower limbs with aid of electric suction pump *Khirurgiya (U S S R)*, 3, 76

137 MCFADZEAN, A J S & TSANG, K C (1958) Chronic leg ulcers in cryptogenic splenomegaly *Trans roy Soc trop Med Hyg* 52, 354

lymphogranuloma inguinale or malnutrition It is necessary to give adequate preliminary nutritional attention to *children suffering from cancrum oris (Fig 182)* before operation is considered Control of sepsis must be achieved as early as possible Tissue defects often become much reduced in size when infection is controlled and healing occurs They are greatly aggravated if operated upon without adequate preliminary treatment of the underlying cause Patients suffering from hypoproteinæmia show very poor healing qualities and have an increased liability to infection There is invariably a low hæmoglobin level associated with hypoproteinæmia It is unwise to attempt plastic operations in patients with a hæmoglobin level below 75 per cent The average hæmoglobin level of patients in many parts of the tropics is much below that noted in the populations of non-tropical countries The low average hæmoglobin percentage (60 per cent) *in the tropics is accounted for by parasitic diseases—largely malaria and helminthic* infections

With limited experience in the tropics there is a temptation to attempt removal of a subcutaneous guinea-worm by open dissection Patients often complain of severe and persistent pain about the legs due to guinea-worms Such an operation is very liable to be followed by gross sepsis in the wound and failure of primary healing, keloid formation may follow such attempts This comment is from early personal experience where such an injudicious attempt was made with a poor result To record it may prevent others doing the same thing

The technique of skin suturing is much influenced in the tropics by the marked predisposition in pigmented patients to form keloid tissue in wounds The obvious lack of appreciation by many surgeons in Europe of the keloid tendency with coloured people is noted in the very severe keloids noted in many African patients following surgery carried out for them while visiting temperate zones The subject of keloid formation is of sufficient importance to warrant devoting a section to its consideration

KELOID FORMATION

The subject of keloid formation is a difficult problem and there are many general and local factors concerned The subject has been given very inadequate attention in surgical literature and it would be of great benefit to persons in the *tropical world if a well planned investigation could be undertaken on the subject* It would necessitate the services of a team of skilled workers with a knowledge of surgery, pathology, biochemistry and applied physiology

Having personally observed a large number of patients with keloid formation affecting various parts of the body, some observations of a general nature have been recorded with a view to seeing if the most important underlying factors could be deduced The following observations are taken from my notebooks

1 Keloids are more common in pigmented than non pigmented persons
2 Certain areas of the body are more liable to keloid formation than others
3 The incidence of keloid formation of the scalp above ear level is very low
4 Keloid formation is very rare in areas containing no fat—penis, scrotum and eyelids

down to the perineum, there is minimal bleeding Without these measures being employed bleeding is often profuse from the veins and arteries of the internal pudendal system Intravenous barbiturate drugs have quite a marked hypotensive effect, and when they are used bleeding from wounds is relatively small They



FIG 181 FIG 182

Fig 181—Congenital defect of feet, supernumerary toes
Fig 182—Child with cancrum oris of lower lip, a difficult surgical problem

should not be used in accident cases where the patient is suffering from shock associated with low blood-pressure Chilling the area of an incision by the preliminary use of ethyl chloride may at times be an advantage, and is quite useful when excising small tumours under general anæsthesia Bleeding is aggravated if an operation is undertaken under local anæsthesia in a nervous patient adequate preliminary sedation should be used when local anæsthesia is employed Certain patients are unsuitable for local anæsthesia because of undue nervousness Tension in wounds precipitating unsightly scars is seen frequently in ear injuries, and keloid formation is liable to occur unless special care is taken to reduce the tension The particularly elastic consistency of cartilage and the presence of infection in open ear wounds following an accident predisposes to unsightly scars at the back of the ear It is often not possible to close an ear wound accurately and without tension if all the cartilage is left *in situ* In these cases the skin should be dissected off the cartilage adjacent to the wound on each side for ½ cm so that a small amount of cartilage can be removed on both sides of the wound If this is done the wound can be closed without tension or difficulty and much better results are obtained

It is particularly important in the tropics that a premature attempt should not be made to undertake plastic repairs of tissue defects in patients who have untreated underlying disease This applies to patients with latent yaws,

21 Keloid formation occurs only if the skin is cut through completely
22 Keloid formation is marked in females if suprapubic fat is incised
23 Keloid tumours show no tendency to become malignant
24 Following excision of keloids and Thiersch grafting keloids often recur at edges
25 Recurrence of keloids is common following excision and direct suture
26 Keloid formation is aggravated by puberty, pregnancy and menopause
27 Patients over the age of 50 show little tendency to keloid formation
28 The application of heat to relieve the discomfort of keloids aggravates them.
29 No evidence of keloids was ever noted in the umbilical scar
30 Wound hypertrophy is maximal eight months after operation, then recedes
31 Sepsis in the wound greatly increases the tendency to keloid formation
32 Keloid formation about the perineum following birth trauma is very rare
33 No keloids were ever noted at the site of lumbar puncture perforations
34 Transverse abdominal incisions in natural skin folds form minimal keloid
35 Keloid formation occurs following third-degree burns but not in lesser degrees

Considering the above observations, it is apparent that keloids occur on external pigmented surfaces of the body only The presence of brown pigment in the skin is an essential predisposing factor They occur only if the whole thickness of the skin is damaged with involvement of the underlying fat It will be noted that the parts of the body where they are not found are the penis, scrotum and eyelid None of these sites contain fat, though they contain pigment The same applies to the clitoris and lesser labia in female patients Keloids of the scrotum or lesser labia are seen only in association with lymphogranuloma inguinale, in these cases there is invariably a leak of fat into them from a more distant site Lymphogranuloma ulceration of the male scrotum may be seen to have obvious fat globules in the discharge from its surface There is strong clinical evidence to suggest that keloid formation is a reactionary process initiated by the degeneration products of fat acting on the pigment layer of cells of the epidermis An analogy to the formation of keloid tissue by an acid "keloidogen" is found in the case of tree-trunk growths where a tumour response occurs as a result of a wound which liberates a hormone "traumatic acid" This substance is in the nature of a dicarboxylic acid—$HOOC\,CH_2\,(CH_2)_6\,CH_2\,CH\,CH\,COOH$ (Fearon)[1] A product of this type is thought to occur in animal fats as a degeneration product A keloid is a fibrous tissue-like growth probably initiated by a keloidogen and then continued by a self-perpetuating nucleic acid Nucleic acid formation may be inhibited by the use of X-rays, radium or other radio-active substances, hence their well-known advantage in treatment of keloid and hypertrophic scars The frequent application of antimitotic substances such as urethane and colchicum have similar actions It is possibly on this antimitotic action that the ancient Chinese remedy for keloids depends Hu[2] reports that removal of keloids can be achieved slowly but consistently by the use of certain indigenous remedies In view of the close relationship between pigmentation and keloid formation an investigation of the pigmentation process is important The opinion has been

5 Keloids of the scrotum and lesser labia are invariably associated with lymphogranuloma inguinale
6 African infants under the age of 2 seldom show keloid formation
7 No keloids noted in tribal marks put on to infants
8 Following female circumcision, no keloids form unless the major labia are cut
9 "Pseudo-elephantiasis of vulva" is a keloid following a boil of one major labium
10 Keloid formation is more marked if the incision crosses the line of nerves than otherwise
11 Following intramuscular injections, keloids are sometimes seen (Fig 183)



Fig 183
Keloid formation at site of vaccination and intramuscular injections

12 Following vaccination, keloids form if deep sepsis involving fat occurs
13 Perforation of African babies' ears does not cause keloids even if septic
14 In African adolescents and adults ear perforation predisposes to keloids
15 If large keloids break down the discharge smells offensively of sebaceous material
16 Palms of hands and soles of feet seldom develop keloid scars
17 Keloids occur only on pigmented areas of the body surface
18 No keloids were noted inside the mouth or vagina No pigment, no sebaceous glands
19 Keloid formation is aggravated if the wound is sutured under tension
20 Pressure of skin sutures may cause keloid formation beneath them

Pigment formation is interfered with by removal of any of the four essential factors on the sequences The food supplying the essential amino acid or substrate may be taken away as in starvation The substrate if present in adequate quantities may be fixed by certain drugs of the nature of benzyl ether of hydroquinone or certain compounds of the nature of parahydroxyphenyl compounds closely allied to thiouracil as used for thyrotoxicosis It is also depressed by sulphydryl compounds like cystine and glutathione

Pigment formation is interfered with as in albinos by the congenital absence of tyrosinase (a suprarenal gland abnormality) The degree of pigmentation is also determined by the abundance or otherwise of melanocytes in the skin This is an inbred genetic characteristic dependent on hereditary factors Pigmentation can be increased by ultra-violet light, heat, chronic inflammation, certain metals and hormones such as œstrogens and androgens Two most interesting examples of "abnormal" pigmentation were noted by French In one case a white woman became coloured brown by an overproduction of melanin In the other cases brown employees of a chemical factory suffered from depigmentation of hands and arms due to handling certain drugs The white woman became addicted to the use of ephedrine which she initially took because of attacks of asthma, ultimately taking very large doses of ephedrine on frequent occasions This substance can act as a substrate in addition to tyrosine in the formation of melanin, and by this means, with very large doses, she developed a dark brown complexion This case was of considerable academic interest The case of coloured persons was rather in the nature of interference with the substrate tyrosine by its fixation or neutralisation by benzyl ether of hydroquinone By direct contact with this substance there was a local failure of melanisation about the hands and forearms This latter incidence was reported by Oliver, Schwartz and Warren [4] A native herb has been used in Egypt for many years as a means of lightening the complexion Depigmentation may occur in patients of dark complexion who are being treated with thiouracil for thyrotoxicosis The effect of sex hormones on pigmentation is quite marked Increase in pigmentation is commonly noted in patients of light complexion at adolescence, during pregnancy and in the premenopausal years when there is a temporary rise in the sex hormones There is an increased tendency to keloid formation when there is a rise in the sex hormone balance, and this tendency is noted in adolescence and pregnancy Cæsarean section abdominal scars associated with a high hormone balance are particularly liable to produce heavy hypertrophic scars, and if they are infected very large keloids may develop in them with discomfort and disfigurement

In patients of light complexion, such as Europeans, it has been noted that they do not develop "sun tan" by exposure to sun if they have been castrated The sex hormones have an obvious relationship to pigmentation Observation would suggest that the hormone balance in indigenous persons in the tropics is in most cases much higher than that noted in persons born in temperate climates With these general factors in mind some consideration must be given to the local factors which have a further influence on keloid formation

Keloids may on rare occasions be troublesome in European patients with a light complexion Glucksmann,[5] investigating the local factors precipitating tissue

expressed[10] that skin pigmentation is related to a specific melanin stimulating hormone which for convenience is termed MSH This substance is found in the pars intermedia of the pituitary gland and is a compound of seventeen amino acid links ACTH is also a compound of thirty amino acid links and it is significant that the first seven links in these chains are common to both substances Following hypophysectomy patients of light pigmentation do not tan on exposure to sunlight French,[3] considering the subject, noted that the colour of skin depended on the presence of oxyhæmoglobin, reduced hæmoglobin, carotin and melanin Melanin is produced to varying extents in persons of different complexion from white to black covering the complete range of complexions It is a metabolic product of the melanocytes, situated in the deep layers of the epidermis If a black child receives a second-degree burn causing blistering and the epidermis comes off, the skin beneath is pink as in a white child (Fig 184) Abnormal skin colour may be seen in certain conditions such as sulphæmoglobinæmia, from the use of sulpha



Fig 184
African child showing white skin following removal of epidermis by burns

drugs in excess Yellowness frequently occurs following the use of mepacrine Certain metallic drugs when injected intravenously may also cause an alteration of the complexion—silver, bismuth, arsenic and mercury Chronic malaria pigmentation of the skin is occasionally noted in those of light complexion Melanin has a very high molecular weight and its formation is dependent on the presence of four main factors a suitable phenolic substrate, an oxydase, the presence of molecular oxygen and melanocytes Food supplies proteins, these are reduced to amino acids, the essential amino acid for pigment formation being tyrosine or *p*-Hydroxyphenylalanine This substrate is acted upon by phenyloxidase or tyrosinase and the melanocytes have a suitable substance made available for the production of melanin Oxygen is supplied from the blood It is of interest to note that if Michel clips are applied to the skin moderately firmly the skin under them becomes white within four to five days but does not become necrotic If the clips are excessively tight the skin becomes gangrenous In the first instance there is oxygen deficiency causing depigmentation, while in the latter there is complete stoppage of the blood supply with gangrene

evidence has been personally noted of any connection between tuberculosis and keloid formation The name "keloid" is derived from a Greek word meaning crab like, as it was thought that some of the hypertrophied and thickened scars resembled a crab Such an appearance can be seen on left shoulder in Fig 185 which shows also very massive keloid around the neck and beard area from ear to ear The keloid of the left shoulder is rather crab shaped in appearance This case was treated by excision of the mass and skin grafting in three stages (Fig 186) Many unsightly keloid vaccination marks are seen in dark patients In endemic smallpox areas of the world it is necessary on occasions to undertake mass vaccination campaigns In view of the keloid risk it is suggested that adult patients should be vaccinated in areas of the body least likely to form keloids—the inner wall of the axilla is a very good place with little tendency to keloid formation and it is also



FIG 187 FIG 188

Fig 187—Jorg Lobo s disease affecting foot, mycos s causing kelo d like masses (By kind permission of Dr Archambault Ghana)
Fig 188—Same patient as in Fig 187 following excis on and skin grafting

easily covered by clothes The condition of Jorg Lobo s disease, as seen chiefly in South America, is one in which irregular keloid masses form in the skin as a result of a deep seated fungus in the tissues affecting the deep layers of the skin It is due to paracoccidiodosis A condition of this type may be seen in West African patients also (Figs 187 and 188), commonly about the foot There is usually no ulceration present but multiple smooth nodules about the ankle and dorsum of the foot The case was treated by excision of the masses and skin grafting It will be remembered that 'mossy foot' is also due to a fungus condition of the chromomycosis or, as sometimes called less accurately, chromoblastomycosis The fungus is situated in the superficial layers of the skin only, subcutaneous fatty layers are not involved as in Jorg Lobo s disease

Keloids about the chest are not uncommon following infection of chickenpox vesicles by scratching (Fig 189) If a Thiersch graft is taken from the outer side of the thigh and is cut at the correct thickness, there is no subsequent keloid formation about the area from which the graft was taken If, however, by misadventure or bad management, the graft is cut too *thick*

reaction in scars, made some important observations Histologically hypertrophic scars and keloids show a very similar appearance In the former there is a recession of the active process after a limited time of some months, while in the latter the activity remains present for a prolonged time—many years Why this is so is not certain He noted that there was a marked increase in vascular connective tissue and inflammatory cells round the blood-vessels Elastic tissue fibres were very scanty or absent The epidermis was flattened The vascular connective tissue decreased after a time with hyaline degeneration and the inflammatory cells diminished The appearances are very similar to those noted in foreign body



FIG 185 FIG 186

Fig 185—Extensive keloids of beard area before operation
Fig 186—Keloids removed from beard area followed by skin grafting Same case as Fig 185

reactions The reaction was considered not of an autonomous overgrowth of scar tissue, but an inflammatory change He noted a patient in which there was very gross keloid formation following spilling of liquid mercury into an open wound It can also be noted that where mercury sulphide is used in tattooing, the substance gives rise to marked keloid formation Glucksmann was of the opinion that displaced hair follicles and keratinised debris were a prime factor in scar hypertrophy and keloid formation Cotton wool, dust and fibres and also talcum powder from gloves may stimulate fibrous tissue reaction Keloids sometimes start following acne folliculitis Foreign-body material rubbed into scars intentionally, as noted amongst some tribes for the purpose of producing cosmetic keloids, is a well known practice In West Africa burnt ground nut ash is used for this purpose in some places Patients who seem most likely to form severe keloids are African women of very dark complexion, well nourished and healthy Those who are thin, undernourished and unhealthy are much less likely to form keloids No

burns (Fig 192) Repigmentation is noted following second-degree burns starting round the area of hair follicles The brown spots subsequently coalesce

If in making surgical incisions the natural folds of the skin are followed, there is a lesser tendency for keloid tissue to occur following operation than if the incision cuts across the natural creases The most suitable incision for opening the lower abdomen is through the natural skin fold between the anterior superior iliac spines on each side This line is of particular value for incision in stout patients (Fig 16) who are pigmented The muscles can be reached without cutting through practically any fat at all The minimum amount of elastic tissue is divided The natural folds of the body correspond approximately to the distribution of elastic



FIG 192

Large second degree burns showing repigmentation starting

tissue fibres The term Langer's lines has been given to these natural folds, having been originally worked out by Langer By making multiple circular skin punctures and observing the line of the resultant skin perforation, it can be observed that this line corresponds to the line of the elastic tissue fibres (Fig 193) It is not always easy to observe the line along which the skin folds most easily, but this can be demonstrated with fair ease as pointed out by McLaughlan,[6] who suggests that by pinching the skin in two directions at right angles to each other the easier line of fold can be detected This can be demonstrated easily at the back of the wrist joint where the natural fold is in the transverse line A ganglion at the back of the wrist is best removed through a transverse line The natural folds about the face can be detected in the same way Whereas it is usual to make a low transverse cervical incision for thyroid operations in the natural skin folds of the neck, this principle is often neglected when enlarged cervical lymphatic glands are being removed The incision along the anterior border of the sternomastoid muscle

and the underlying fatty tissues are entered there is frequently keloid formation subsequently produced as seen in Fig 190





Fig 189 Fig 190

Fig 189—Keloids of presternal area following scratching of chickenpox vesicles
Fig 190—Keloid formation due to Thiersch grafts being removed by poor technique

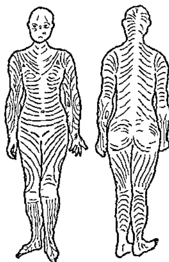


Fig 191
Keloid formation following third degree burns of forearm

Keloid formation follows third degree burns where the whole thickness of the skin is damaged (Fig 191) but not following second degree or first-degree

keloids are excised the full thickness of the skin is penetrated and the fatty layers beneath entered. The denuded area following excision must be closed accurately and *without tension*. *To achieve this, it is* necessary to make an extensive undercutting of the skin edge for from 1 to 2 in. all round so that the edges can be approximated without undue tension. If further accessory incisions are made, they, too, will produce further keloids. *In complete excision of keloids the skin* should be cut strictly at right angles to the surface and not bevelled, as is likely to happen if the incision is placed unduly near the edge of the keloid with a view to conserving the maximum normal skin tissue possible. *If following excision the* skin is undercut for an adequate distance, it is usually possible to close the wound without tension. Great care must be given to hæmostasis, and a pressure bandage used particularly where the skin has been undermined. An immediate rather than a delayed skin graft is advised to prevent sepsis. Kurtin [7] has used the high-speed electric rotating abrasive wire brush for the removal of keloids. This apparatus has a rotary brush working at 12,000 r.p.m. Hæmorrhage is decreased by the preliminary application of an ice pack in a polythene bag. To facilitate freezing, 5 per cent. propyline glycol is added to the water. An ethyl chloride spray can also be used as a hæmostatic prior to electro-abrasive treatment. With care keloids can be removed by this means without re-entering the fatty layers beneath the keloid so that the likelihood of a leak of fat is reduced. The method of removal of keloids by high-speed wire abrasive rotatory brushes is of interest *but not a practical suggestion for those working in small country stations where* apparatus is very limited but where large unsightly keloids are most often seen. As tension in wounds and contamination by loose fatty material are two most *important factors in the* production of keloids *in* dark-skinned patients, some method must be adopted, if at all possible, whereby neither is reintroduced with removal of the keloid mass. The most practical method of achieving this is to "shave off" the keloid, not completely, but at a fraction above skin level (Fig. 194). A keloid which protrudes above the surface level of the body also extends downwards somewhat in a saucer-like manner into the subcutaneous fat. If the keloid is cut off with a very sharp knife, entering the scalpel only 1/16 in. above the normal skin, but rigidly avoiding the normal skin, the subcutaneous fatty layer is not entered and the base remaining after partial excision consists of fibrous tissue with some blood-vessels in it. After hæmorrhage is arrested one complete unbroken skin *graft is immediately applied, extending beyond the margins*; *this prevents* the hazard of sepsis by delayed skin grafting. In order to avoid cutting normal skin inadvertently an initial incision should be made round the edge of the keloid as a guide, *keloid tissue only being entered*. The knife must be very sharp and the keloid must under no circumstances be pulled forcibly upwards while it is being cut off, otherwise the base may be penetrated and fat will leak on to its surface. If necessary the normal tissues along the sides of the keloid can be depressed in order to give a better view. This is not a difficult operation in areas of the body where the keloid is well raised as a single mass above the surface; it may be quite difficult in concave areas, as beneath the lower jaw. The recurrence rate by this method is low and with advance of time the skin-grafted area becomes less apparent. No sutures at all are used.

is less suitable for block dissection about the neck in pigmented patients than in those who have little tendency to form keloid scars If the best wounds are to be achieved in pigmented patients it is advisable to use internal sutures only, the skin finally being approximated by small Michel clips only Figs 15 and 16 show two abdominal wounds for comparison, both photographed approximately the same number of months after operation If cutting needles are used to insert skin stitches there is a leak of fat from the deep tissues into the superficial layers of the skin, this is followed by quite a marked keloid formation in some patients This difficulty can be circumvented by two methods One is to avoid perforating the skin at all and relying upon well-closed deep tissues using adequate catgut and, if thought necessary, three or four deep floss nylon ligatures The wound is finally closed with Michel clips If it is considered that skin stitches are essential, keloid formation at the suture positions can be prevented if monofilament nylon is inserted with well-oiled straight non-cutting needles In order to perforate the skin with a non-cutting needle, the needle should be held with a strong needle-holder 1 in back from its point and dipped into sterile liquid paraffin before insertion This method has a great advantage The actual perforation of the skin with an oiled non-cutting needle is much smaller than that caused by a cutting needle This prevents fat leaking back along the suture track A small container of sterile liquid paraffin should be placed on the instrument table for this purpose as a routine procedure A continuous fine chromic gut ligature should be inserted in the subcutaneous areolar tissue on the deep surface of the skin and the wound then washed out with a detergent solution before the clips are inserted, this removes all fat and swab fibre particles from the edges of the skin It may be an advantage to apply sellotape across the wound at intervals These suggestions for reducing or preventing keloid formation are a little time-consuming, but the extra time spent gives satisfaction to both the patient and the doctor Whereas X-rays and radium products are used to inhibit keloid formation, they are not at present a practical proposition for routine use in most parts of the tropics, careful suturing and removal of loose fat giving moderately satisfactory results for practical purposes


FIG 193
Diagram illustrating disposition of Langer s lines

Keloid formation is seen in recent years much less frequently than formerly This particularly is the case in the large centres and is probably due to the better control of sepsis with modern drugs and the increasing amount of surgery undertaken in recent years in the tropics Large spectacular keloids take many years to grow—from five to twenty

Following treatment of keloids by complete excision and Thiersch grafting there is often a recurrence of the keloid around the edges of the graft When

necessary for the survival of these children and this is not always available The relative frequency of deformities is ill appreciated The cause of cleft palate is not known Illness or abnormality in the mother during pregnancy may predispose to facial fusion defects in the infant Toxæmia, hydramnios and infective fevers are frequently noted during pregnancy in the mothers of defective infants Cleft palate may be hereditary as in syndactylism

In few centres in the tropics is surgery yet fully divided into particular specialities Many infants with hare-lip are born in remote villages and the parents find great difficulty in bringing them to the larger centres for surgical treatment Parents are usually willing to have an operation carried out for their infant's deformity if this can be undertaken in the local district hospital Country stations are frequently staffed by the younger doctors, sometimes with limited surgical experience, and they may be apprehensive about undertaking an operation for the repair of hare-lip To obtain a satisfactory result following a plastic operation for hare-lip is most gratifying to the parents and the doctor Having personally undertaken several of these operations in these circumstances, the basic principles of treatment can be indicated In infants with hare-lip and cleft palate the hare-lip alone should be initially closed The operation is best undertaken at the age of 4 weeks If surgery is deferred for a longer time the gap in the lip tends to widen The infant's hæmoglobin level at this age will probably still be high The hæmoglobin percentage should be tested before operation—it should be not less than 75 per cent Many very young children in the tropics develop malaria, in some instances congenital infections with malaria are noted Treatment may be required even at this early age

The safest and most suitable anæsthetic for infants undergoing hare-lip operations is open ether, oxygen can be given in addition with advantage After induction with open ether the anæsthetic can be continued most satisfactorily using ether vapour from a Junker's inhaler bottle, a catheter can be passed through the sound nostril for its administration A Y-tube should be added between the bottle and the catheter so that oxygen can also be given Those who specialise in hare-lip operations describe various techniques with great precision and at length There are innumerable incisions described to meet varying circumstances The most important basic principle to remember in repairing a hare-lip is that in order to avoid a residual upward V appearance of the upper lip

angle

a thin

tured

together, there will certainly remain an upward notch at the site of union of the two sides The end results will be poor Cutting the lip initially on each side at right angles prevents this error and ensures the correct apposition along the line of the upper lip The remaining incisions can then be undertaken in such a way that the upper part of the cleft is approximated and joined with the minimum loss of tissue and with the least possible tension in the wound The type of operation which has personally been found most simple and satisfactory is indicated in Fig 195 This method gives a step like union which is a little less conspicuous than those planned which give a curved scar

The free use of vitamin C before operation has been recommended as being of value in reducing the tendency to keloid formation in dark patients No advantage has been noted personally where large doses of vitamin C are given to patients with developed keloids Injection of keloids with 150 mg of hyaluronidase in 2 per cent procaine has been recommended as a means of reducing developed keloids In personal experience however this form of treatment also has not been found helpful and it is extremely painful to the patient The hard keloid tissue must be injected with a metal syringe under very high pressure Injection of keloids with cortisone has also been recommended but this method has not

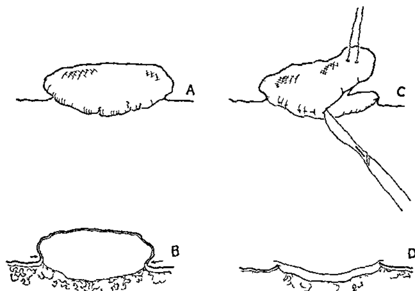


FIG 194

D agram llustrating shaving off of kelo d pr or to skin grafting A Kelo d mass B Kelo d n cross secton C Method of exc sion shaving off) D Dress ng over skin graft

been tried *If keloid scar tissue bridges a joint it is advisable to excise a portion* of the scar and insert a pedicle graft of full thickness skin so that the movement can be restored If this is done further limitation of movement is avoided This is particularly important about the flexor aspect of the elbow and the knee It is also the case where scar tissue limits neck movement between the chin and the shoulder

HARE LIP AND CLEFT PALATE

Hare-lip and cleft palate appear to be much less frequently seen in tropical countries than in temperate zones It is difficult to estimate the frequency of these conditions for many deformed children are hidden away and a high proportion of infants with cleft palate or hare-lip die in the neonatal period Extra care is

membrane To hold the premaxilla in a sequestrum forceps facilitates replacing it Replacing the bone may cause a slight degree of shock to the infant and it is sometimes necessary to wait a few minutes till the breathing rhythm is properly adjusted In cases of extreme displacement it is probably better to remove the bone altogether, as in these cases it may be attached by a narrow stalk and will not fit back into the gap into the anterior defect in the hard palate

A Brophy's metal bow was at one time popular as an instrument to maintain apposition of the two sides of the lip without tension following suture It is strapped in position Satisfactory results have been obtained following a three-layered closure by putting two long tensions right through the central layer of the repair The tension sutures go through fine rubber tubing If the tension sutures are simply put through the lumen of the rubber tubes and tied at one end, the tubes are of little advantage and the stitch is liable to cut through the skin to some extent If, however, the nylon is inserted with the needle through the side of the rubber tube, entering and leaving it about ½ cm from its end, and tied between the tube and the lip, the excess of rubber tubing beyond the stitch position at each end prevents the tube being buckled and permitting the stitch to pull through the tissues This simple point of technique has been found to be of considerable advantage and it requires no special apparatus Following operation it is advisable to give the infant 100 c c of subcutaneous sterile saline to prevent depletion of fluids Very young infants do not stand dehydration well The loss of blood with hare-lip operations is usually small If much blood has been lost a small transfusion may be advisable One dose of long-acting penicillin, 250,000 units, should also be given while the infant is still under the anæsthesia If any further penicillin is considered necessary, it should be given by mouth to avoid crying or struggling which follows administration by injection in infants Straining is detrimental to the wound suture A dressing over the suture line is not a great advantage, it tends to get wet and soiled easily and crying induced by changing it agitates the infant An application of sulphanilamide powder is sufficient, the powder can be repeated as required without undue discomfort The baby's hands should be tied loosely by his side Whereas these infants are sometimes fed by spoon following operation, no disadvantage has been noted where breast feeding has been permitted They are much quieter if attended to in this way Nepenthe, 2 minims, four-hourly, can be given with advantage, the dose being modified [illegible] effect The child should be well sedated Coloured babies of this

thickening of scars is not a serious problem

should be removed under general anæsthesia after ten days It is not an advantage to remove them earlier The results of hare-lip operations are usually very satisfactory and only in rare cases do the defects fail to close Figs 196 and 197 show a schoolgirl before and after operation for hare-lip

Cleft palate cases seldom come for treatment in tropical countries from the indigenous population It is thought that most of these cases succumb soon after birth due to inadequate care because of the infant's inability to feed properly Having personally seen and dealt with only a few cases of cleft palate, it is possible here to give only an indication of the principles of treatment, rather than express

major hæmorrhage They do not damage the lip in any way The forceps should be put on slowly, and an interval allowed during their application, for when they are inserted the infant frequently stops breathing for some seconds To repeat procedure on both sides hurriedly might be dangerous After the incisions as suggested have been made, it is helpful to put in one fine nylon suture at the lowermost part of the skin edge just above the vermilion part of the lip This helps greatly in estimating the positioning of points to be approximated and united The suture is left long and a forceps applied as a retractor As in closing any fistula the lip should be closed in three layers The sutures on the deep surface

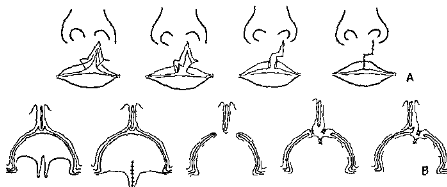


FIG 195
Diagrams illustrating hare lip and cleft palate operations A Hare lip repair—step operation B Cleft palate—various types

of the lip are best applied first from the position of the retraction suture and working upwards Catgut 000 is most suitable in the mucous membrane layer When the upper part of the defect is reached, it will be obvious that a certain amount of release of mucous membrane is necessary to allow approximation of the primary edges to be united The release incisions can be planned most easily by observing the parts which are coming under tension at the junction of the alveolar edge and the lip The intermediate layer should then be closed with catgut 00, this being inserted from in front The step-like lowermost part of the wound can then be sutured, the initial stitches being inserted at the position of the angles of the steps It is not unusual to find that there is a little more tissue available at one side than the other It is necessary to place the sutures accordingly so that they are evenly distributed If the premaxilla is not unduly prominent the lip can be closed over it The closure of the lip tends to push the bone back into position slowly as the infant grows Within the next five or six months there is marked improvement in the disposition of the bone If the premaxilla is grossly displaced and it is not possible to close the lip over it, it may be possible to push it back forcibly, causing a slight fracture at its base, but without tearing the mucous

cleft palate operations The first is that the main blood supply of the palate mucosa is through the posterior palatine arteries, great care must be exercised that these blood vessels are not damaged as they emerge from the posterolateral aspect of the hard palate The anterior palatal artery is of lesser importance The second important principle is that the periosteum of the hard palate should be elevated from the bone in conjunction with the mucous membrane of the palate If an attempt is made to elevate the mucous membrane alone the sutures will certainly not hold The initial incisions in the palatal tissues should be made one on each side along the inner aspect of the alveolar ridge reaching from the position of the second incisor tooth site in front to close to the estimated position of the posterior palatal artery, great care must be exercised to avoid damage to these vessels The incisions should reach down to the bone and the mucous membrane and periosteum elevated as one sheet of tissue from without inwards When the edge of the cleft defect is reached a narrow edge should be excised from the margins of the opening In order to release the posterior tissues of the palate adequately the hamulus can be severed on each side This allows the tendons of the tensor veli palatini on each side to be displaced medially With adequate release of tissue on both sides and the edges of the defect excised the nasal mucous membrane on the superior aspect of the hard palate can then be released A sharp angled instrument is used for this purpose, such as that used by dental surgeons This mucous membrane should be released for 1 cm on each side which permits of it being drawn medially to approximate with that of the opposite side In order to get the two sides evenly approximated an initial stitch should be placed through the soft palate tissues at the uvula position After suture of the mucous membrane on the nasal side of the palate with chromic gut oooo, the muscle layer of the soft palate should be joined behind and the fibroperiosteum over the hard palate position brought farther forward Chromic gut ooo should be used in this middle layer Finally, the buccal mucous membrane is sutured with chromic catgut oooo completing the repair It is difficult in cases where there is a large hard palate defect to make an adequate repair which will in addition leave sufficient tissue present in the soft palate position to permit of closure of the nasopharynx during speech and deglutition In cases where there is a soft palate defect only and no bony deficiency in the hard palate position it is usually possible to unite the sides of the soft palate in a three-layer repair following a release of tissue from before backwards by a semicircular incision round the inner side of the alveolar margin This permits, after elevation of mucous membrane and periosteum, of the complete layer of tissue being retroposed and so permitting the soft palate to reach the posterior pharyngeal wall By this means ororhinal physiology is improved The anterior denuded part heals by granulation tissue and later becomes epithelialised

of the mucous membrane released to the nasal mucous membrane on the upper aspect of the defect laterally

opinions of value In cases of severe hare-lip there is a degree of anterior cleft palate due to the anterior defect associated with the displaced premaxilla in the forward direction It is sometimes possible at the initial hare-lip operation to elevate sufficient mucous membrane from the base of the nasal cavity on each side of the nostril concerned to close the defect between the mouth and the nose If this is not possible, the hare-lip alone should be closed and a secondary operation undertaken at a later date The optimum time for cleft palate operation is the age of 5 years

Cleft palate is divided into three degrees division of the soft palate alone, division of the soft palate and incomplete division of the hard palate, in the third degree there is complete division of the soft palate and the whole of the hard palate In the extreme cases the defect is associated with a hare lip in almost all



Fig 196



Fig 197

Fig 196—Adolescent patient with hare lip before operation
Fig 197—Same patient as in Fig 196 after operation

cases In second-degree cleft defects there is usually a communication between the buccal cavity and the nasal cavity on both sides—the nasal septum, formed partly by the vomer, not reaching the hard palate In some cases the cleft may communicate with one nostril only while in most it enters both sides Apart from the soft tissue defect there is in most cases some degree of congenital defect of the development in the maxilla This gives rise to a slight dilemma If an attempt to close the cleft at an early age is made there is interference with the further development of the maxilla due to interference with the blood supply as the mucoperiosteum is raised from the buccal surface of the hard palate, while if the repair of the palate defect is deferred until the child is grown up the defect becomes relatively much wider and this makes the repair more difficult There is in addition gross interference with speech development A compromise is therefore usually arrived at, and the consensus of opinion favours cleft palate operation at the age of 5 years as being the optimum time

There are two basic principles which should be appreciated in performing

the most satisfactory skin-grafting knife for this purpose is that of Braithwaite, designed with the co-operation of Messrs Allen & Hanburys, London It is essential to have an efficient instrument which has the minimum of movable parts liable to damage This piece of apparatus is a modification of the earlier Humby's skin-grafting knife It is strong but light in weight, and the blades are expendable like safety razor blades A very sharp cutting edge is thus available for each graft taken The more complicated instruments and electrical equipment are less suitable as standard apparatus in the tropics With the Braithwaite pattern knife (Fig 199) grafts of split skin of 3 in by 8 in can be removed in one complete sheet from a donor area without difficulty This amount is ample to cover most of the defects for which a skin graft is required Several strips may be cut if necessary for extensive burn cases

In some cases full-thickness skin grafts may be considered most suitable These may be removed as free grafts from areas of the body normally covered by clothes The donor area gap is closed by suture in European patients, if necessary

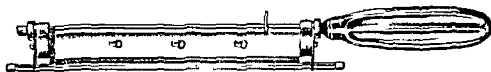


Fig 199
Braithwaite s skin grafting knife as recommended for Thiersch grafting
(By kind permission of Messrs Allen & Hanburys, the manufacturers)

following release incisions Closure of such defects by suture alone in dark patients would cause unsightly keloids and so the donor area must be covered with a Thiersch graft alone In uncircumcised male adult patients in the tropics the prepuce affords an area of skin suitable for free grafting and will in most cases cover an area of up to 8 sq in Fig 130 illustrates skin grafting of a foot ulcer with prepuce skin following circumcision. Where skin of this type is not available in circumcised male patients full-thickness skin can be removed from the back of the scrotum A sheet of skin 8 to 10 sq in can be removed from this site without difficulty and the defect closed without tension As the penis and the scrotum do not contain fat they are not liable to keloid formation following incision and suture The wounds can also be closed without tension The excess areolar tissue is removed from the back of the skin before it is sutured in the new position The " take " rate is very high when either of these types of skin is used as a free graft

In patients in Europe transfer of full-thickness skin in the form of a free graft from one part of the body to another has been employed with moderate success The defect at the donor site is then closed by sutures and a small central Thiersch graft if necessary If an area which crosses a joint surface requires skin grafting full-thickness skin gives a much better result than when a split-skin graft of Thiersch type is used The thin grafts adhere firmly to the underlying tissues and

SKIN GRAFTING

Repair of surface defects by various techniques of skin grafting constitutes a major section of plastic surgery In young children in the tropics under the age of 2 years, there is no special problem or difficulty noted with reference to keloid formation in surgical wounds It is quite exceptional to have any difficulty in this respect following repair of a hare-lip in a young child In adults, however, there may be keloid formation following closure of defects by whatever means is used, unless the greatest care is given to clearance of fat from the wound edges before closure, avoidance of sepsis, prevention of hæmatoma formation and safeguarding against tension in the edges sutured In patients of dark complexion closure of skin defects which relies on approximation of adjacent skin by the use of release incisions and ultimate closure of the wound by sutures under tension, no matter how well the tension is distributed, is very liable to be followed by keloid formation One cannot therefore with impunity "dig one hole to fill another" It is of interest to observe that if a tube of skin is raised from the body surface with a view to transferring it to another site on the body, the edges of the raised skin where they are sutured together do not show any wound hypertrophy or early keloid formation, while if an attempt is made to close the site from which the tube was raised by drawing the edges together with sutures under tension, marked keloid tissue forms both in the wound itself and at each of the suture perforations The conditions in the two suture lines are presumably very comparable, other than in the respect of tension in them, following suture The final result of healing in the primary wound is very unsightly even though the operation may attain the object for which it was designed In the illustration shown (Fig 198) a tube of skin was raised from the front of the chest and inserted into the right side of the neck to correct a severe flexion deformity of the neck following burns in early childhood. Cosmetically the result was poor, but functionally very good The presternal area is a site particularly liable to keloid formation It may be desirable in such cases to deal with the situation by other methods



FIG 198

Skin tube transfer operation to rectify flexion deformity of neck due to burns Marked keloid formation at site from which skin was transferred

For closure of minor defects split grafts of the Thiersch type are very suitable and it is essential that practice is gained in cutting good grafts of this type as they are used so frequently in plastic surgery An open razor is often used, but much

area a Thiersch graft to start with, and then remove the remaining skin from this oozing area, cutting the graft in an appropriate symmetrical shape corresponding to the area to be grafted He then removed the skin from which the Thiersch graft was initially removed and placed it on the area to be grafted but in the "inside out" position This apparently extraordinary move was really very sound for by so doing he brought a complete layer of living skin cells into direct contact with the bed of the area to be grafted The exposed surface of the graft is then covered with the original Thiersch graft taken off at the start of the operation The Thiersch graft is used as a "physiological dressing" on the exposed surface of the thick skin which is the original under surface and therefore showing the pitted appearance originally referred to This Thiersch graft may take in about 50 per cent of the cases, but if it does not a further Thiersch graft is applied after ten days By this time the free skin graft shows a granulating appearance On this surface a Thiersch graft takes very easily and so within three to four weeks you have a good full *thickness graft secured in any desired position and without the discomfort of* plaster fixation The final result gives a good strong thick layer of skin in the desired area, it moves over the underlying tissues and there is considerable elasticity present in the final skin The original site from which the thick free graft was taken is Thiersch-grafted immediately after the full-thickness skin is transferred —this prevents infection of the area The cosmetic results achieved by this method are excellent and the final appearances approximate very closely to that of normal skin, it has not the smooth shiny appearance seen following split-skin grafting Contrary to expectations, the hair follicles do not give rise to any subsequent trouble *This method is very useful for skin grafting about the neck when it is* necessary to excise scar tissue following burns It is convenient to take free grafts from the outer side of the thigh, as it is a position which is not very likely to form severe keloid tissue and the part is normally covered by clothing

If a wound is present in the concavity of any area of the body such as about the submaxillary area, or over the flexor area of a joint, a contracture is liable to develop The disability produced can be reduced to a very considerable extent by the use of the Z double flap skin technique The initial incision is placed along the line of the original contracture and from each end of this incision a lateral ... incisions ... incision ... ition with each other When they are sutured in the new position it will be seen that the final suture line between the flaps is at right angles to the line of the original scar In this way the patient's disability is greatly reduced and a joint previously *held* by scar tissue can once more be straightened out It is worth practising these incisions on paper to become familiar with the design required and the optimum position for the lateral incisions so that on completion the flaps fit neatly together

It is desirable to use penicillin as a safeguard in plastic surgery in addition to the standard precautions to guard against infection

have no elasticity, they do not stretch well and are rather liable to break down on small provocation Nelson and Semambo[8] found Thiersch grafting of leg ulcers satisfactory in East Africa following a course of penicillin The method has been well accepted by other workers as showing good results in a high proportion of cases In some cases, however, particularly over joints, full-thickness grafts give better results

Attempts to graft ulcers with full thickness skin by cross-leg flaps are seldom satisfactory in the tropics Not more than 50 per cent of such operative attempts are entirely satisfactory It is extremely difficult to get adequate fixation of both legs which is essential to success The use of large amounts of plaster of Paris to fix the legs in a warm climate makes patients most uncomfortable The plaster is also expensive and might be better employed for use in fracture cases The patients perspire freely beneath the plaster and on occasions ants get down the sides of the plaster causing intolerable irritation, sepsis is very difficult to avoid in these cases Whereas the cross leg flap may unite with the skin of the other leg over the ulcer area if neatly adapted and sutured there, there is a serious risk of infection under the flap close to the leg from which it is raised It is not always appreciated that to avoid gross contamination the raw area beneath the flap must have a Thiersch graft applied to back it A cross leg flap is therefore really a combination of a pedicle graft and a Thiersch graft

Any method which would secure an equally good thick-skin graft without the necessity of fixing the legs would be most welcome in the tropics An excellent method of achieving this object has been designed by Hynes[9] He devised a simple though very ingenious original technique which ensures a very high percentage (95 per cent) of successes in free grafting The original reason for undertaking cross-leg pedicle grafts was because of the risk of inadequate nutrition in a free graft while it was being established in the new site Maintaining attachment of the [illegible]

of sepsis at the base of the flap The success rate with free grafting is little above 50 per cent and naturally the high proportion of failures discourages further use of the method so it is not very popular The reason for failure with free grafts of full thickness skin is in most cases inadequate apposition between the deep surface of the skin and the area to which it is being transferred Hynes pointed out that if a skin flap is raised from the surface of the body, and its under surface examined critically, it can be noted, after clearance of the fat from its deep surface down to the level of the true skin, that the under surface of the skin is made up of a series of "pits" or inverted domes when the skin is looked at from beneath In each recess there is a minute nodule of fat surrounding a hair follicle system with its sebaceous gland If this almost honeycomb character of the deep surface of the skin is taken into consideration it will be understood that when the graft is laid in its new position on the area to be grafted, not more than 30 per cent of the under surface of the actual skin comes into direct apposition with the bed it is placed on On the assumption that failure in free grafting was due to this poor physiological contact, he decided to remove from the proposed free graft donor

20

Blood Transfusion

BLOOD REQUIREMENTS

WITH the free use of blood transfusion the scope of operative surgical work has been greatly increased within the past twenty years Many operations are now planned which would be impracticable without the use of blood replacement

For practical purposes it can be taken that the total blood volume of the body in an adult is 10 to 13 pints, depending on the body weight That is roughly 1 pint per stone of body weight The hæmoglobin level should be 100 per cent but it is seldom above 75 per cent in countries where ankylostomiasis, schistosomiasis and malaria are endemic There should be a normal relationship between the various blood constituents If the hæmoglobin level is below normal the serum protein is usually also below normal If an adult sustains a hæmorrhage of traumatic or pathological origin, the hæmoglobin level falls at the rate of 10 per cent per pint of blood lost Although immediately following the hæmorrhage there is no apparent alteration in the hæmoglobin level this becomes obvious within twenty-four hours as the blood becomes diluted by tissue fluids so that the original volume is restored Hæmoglobin estimation may be undertaken by several methods For practical clinical work the Tallquist method is quite good and the ease with which it can be undertaken commends it, in spite of its slightly lesser accuracy than estimations undertaken by other means Methods which express the result as grams of hæmoglobin per 100 c c of blood are not so easy to carry out at the bed site A healthy hæmoglobin level should be 16 gm per 100 c c of blood The fallacy of assessing the blood loss by hæmoglobin estimations is that there is no guarantee that the initial blood level was 100 per cent As African hæmoglobin levels vary so enormously before any hæmorrhage

esult

nent

nces

it may be necessary to give a rapid transfusion to overcome the initial major blood loss sustained Blood can be given to start with at the maximum drop rate at which the drops can be counted When the hæmorrhage is arrested by operation or natural means the transfusion rate must be reduced A good practical rule for estimating the rate of blood transfusion is to remember that with standard equipment

One pint given at 40 drops per minute takes four hours to complete
One pint given at 80 drops per minute takes two hours to deliver
One pint given at 160 drops per minute takes one hour to transfuse

REFERENCES

1 Fearon, W R (1957) Keloid formation Personal communication
2 Hu, C-K *et al* (1955) A preliminary report on the treatment of keloid with old Chinese remedies *Chin med J* 73, 273
3 French, E B (1954) Pigmentation. *Edinb med J* 61, 215
4 Oliver, E A, Schwartz, L & Warren, A (1940) Occupational leukoderma *Arch Derm Syph (Chicago)*, 42, 993
5 *Glucksmann, A (1951 52) Local factors in histogenesis of hypertrophic scars Brit J plast Surg* 4 88
6 McLaughlan, C. R (1958) Personal communication
[illegible] *Syph (Chicago)*, 68, 389
[illegible] *E Afr med J* 33, 189
[illegible] or tubed grafts *Brit J plast Surg* 1, 97
10 The Editor (1957) Pigmentation and MSH (melanin stimulating hormone) *S Afr med J* 31 (ii), 819

Many patients in the tropics suffer from a marked degree of hypoproteinæmia, this is seen in chronically ill patients Blood transfusion benefits these patients greatly but the blood should be transfused very slowly Chronic infections damage red blood cells and many patients, particularly with chronic bone infections, are found to be in a low state with both a low hæmoglobin level and a low blood protein level The use of blood transfusion was relied upon more frequently in these cases before the introduction of the antibiotic drugs

On rare occasions patients may swallow chemical substances of the benzol group This causes rapid blood destruction, and blood transfusion is essential in the treatment of benzol and naphthalene poisoning One case was noted where a child drank some clear fluid which had been kept for washing paint brushes He died from an acute hæmolytic condition within four hours of swallowing the substance Blood transfusion was not given as the nature of the fluid taken was not initially appreciated by the doctors who saw the case

In tropical countries particularly, severe hæmolysis is noted in some cases of snake-bite of the viper type There is frequently in addition an extensive serum loss into the local tissues in the part bitten with an enormous œdematous swelling and surface blistering due to the histamine-like action of viperine venom Blood transfusion is indicated in many of these cases Treatment of snake-bite is dealt with in some detail in Chapter 23

Internal hæmorrhage of less than half a pint usually gives rise to some degree of shock, but if the volume does not exceed this amount circulatory recovery is rapid following rest and application of heat There is initial clamminess of the skin with sweating, a rise in the pulse-rate and sometimes vomiting In estimating circulatory failure from a practical point of view, it is very significant to note that if the patient's nose remains cold in spite of warmth being applied to the body sufficient to heat him up elsewhere, there is still a degree of circulatory failure In fact, the nose is about the last place to heat up Green and Metheny [2] employed the "tilt" test to estimate the volume of blood lost by hæmorrhage, internal or external, by noting the alteration in pulse-rate when a patient is tilted from the horizontal position to an angle of 75 degrees An Extract giving details of the test is appended to Chapter 7 If on tilting a patient to this angle there is an increase in the pulse-rate by 20 beats per minute, it can be taken that there is a blood loss of 500 c c to 1 pint If the pulse-rate rises by 40 beats per minute on tilting, the blood loss is likely to be 1,000 c c If the pulse-rate increase is 40 per minute and is in addition accompanied by constitutional signs—dizziness, faintness or twitching—there is almost certainly a blood loss of 1,500 c c *These data were* deduced and carefully recorded from observations made on volunteer patients from whom measured quantities of blood were withdrawn quickly If an adult patient is given a blood transfusion of 1 pint his hæmoglobin rises in most cases by 10 per cent *Neonatal infants may on rare occasions require* a blood transfusion It is seldom appreciated that if when performing a Cæsarean section the placental site is incised and the placenta cut into inadvertently, some of the blood lost from the placenta comes from the maternal circulation, but some also comes from the *fœtal circulation* As an infant of 7 lb is only one-twentieth of the body weight of a 10 stone adult the loss of 1 oz of blood in an infant is equivalent to a loss

This is a useful approximation and moderately accurate for standar
indicators

A Hemming's Leipzig automatic drop timing indicator may be use
rate-regulating handle on a dial is incorporated in the apparatus, the scale
standardised for use with 5 per cent glucose solutions delivered from a con
at 1 metre height It is difficult to count drops at a rate much faster than 16
minute A dropping rate that might be termed "very fast" delivers 1 pi
blood in approximately an hour Blood can be given quite safely at this
during operation where blood is being lost continually Most operations wh
take less than an hour, such as herniorrhaphy and radical cure of hydrocele, do
necessitate blood transfusion In certain other types of operation of relatively sh
duration, where a hæmorrhage is considerable, a blood transfusion is desirab
It is a useful practical rule to give 1 pint of blood for every operating hour exceede
If an operation exceeds one hour give 1 pint, if it exceeds two hours give 2 pint
Very few operations exceed three hours in general surgery Neurosurgica
procedures may take several hours to complete, but the blood loss is not necessaril
high If patients are suffering from chronic illness accompanied by sepsis with
a low hæmoglobin level, it is desirable to give a blood transfusion very slowly
Edington [1] suggests a rate of 70 c c per hour in anæmic patients which would
give a drop rate of 20 to the minute or 1 drop per three seconds This is obviously
a very slow rate Because of the risk of increasing the total blood volume in an
anæmic patient, it is desirable in some cases to give a "packed cell" transfusion
The blood is allowed to settle and when it has done so about half the supernatant
fluid is removed before the concentrated cells are transfused into the patient
Blood transfusion finds its greatest usefulness in cases of hypovolæmic shock
which can be due to various causes The most common causes are acute trauma,
pathological internal hæmorrhages and obstetrical exsanguination Circulatory
depletion is often severe due to blood loss into the tissues in accident cases, as
when a limb is crushed, or where there is a fractured pelvis In these cases there
is a very marked loss into the local tissues without bleeding being visible externally
Following secondary hæmorrhage from peptic or typhoid ulcers internal hæmorrhage
is often severe and even fatal in some cases Ruptured ectopic pregnancy gives
rise to massive internal hæmorrhage, and hypovolæmic shock develops rapidly
Other serious forms of blood depletion are noted in cases of excessive exudation
of blood serum as a result of local congestive states This occurs in intestinal
obstruction due to a massive pouring out of fluid into the bowel above the level
of the obstruction In these cases blood transfusion is most helpful The primary
cause of the obstruction must be dealt with while the transfusion is being given
Fluid loss from the circulation is one of the major factors in production of shock
in intestinal obstruction Circulatory loss is also the case in the secondary shock
associated with extensive burns In all these forms of hypovolæmic shock blood
transfusion is indicated Blood plasma substitutes are of temporary advantage
only, but nothing can substitute adequately whole blood as a replacement for the
blood lost Obstetrical hæmorrhages, both antepartum and post-partum, make a
serious demand for blood replacement by transfusion In untreated incomplete
abortion cases there is often a serious hypoproteinæmia produced

This substance was of enormous advantage in areas of the world where it is still very difficult to persuade relatives to part with a pint of blood in the interest of a member of their family The difficulty is increased when blood is sought for a patient who is not a member of the family Plasma restores blood volume adequately and is retained for a prolonged time in the circulation In cases of shock this is more important than replacement of red blood cells Whole blood is in most cases more advantageous, but it has the disadvantage of being difficult to procure when required and may not be of the correct blood group even if donated willingly Restoration of blood volume by the use of saline or glucose is of very limited use as these substances are quickly lost from the circulation through renal secretion. "Intradex" is a chained glucose product with a very high molecular weight and as such is not easily excreted through the kidneys It is retained within the circulation in decreasing percentages during the seven days following its administration There is still 75 per cent remaining in the circulation twenty-four hours after it is given *About 20 per cent of the balance is lost for every successive twenty four* hours In the event of blood being unavailable this substance is a valuable substitute particularly in burns and intestinal obstruction cases where the main loss is blood plasma into the surrounding tissues It may be life saving during the time a full blood transfusion is being arranged There are several comparable plasma substitutes made by the different commercial firms "Plasmoid' is a gelatine preparation used as a 5 per cent solution It is a useful alternative as no *typing is required, it keeps well and does not give rise to any reactions* The preparation was marketed in America by Upjohn Ltd

HEALTH AND DISEASE IN BLOOD DONORS

The initial selection of blood donors necessitates the exclusion of persons infected with transmissible illness and those who might themselves be adversely [illegible] *ness on the part of* [illegible] eriousness of a loss [illegible] ice to agree to the voluntary removal of blood by persons who ill understand the rationale, scope and management of blood transfusion Only in a highly organised community is it possible to procure with any ease a constant supply of blood from voluntary donors Members of the community may require blood for replacement of loss following *serious injuries by accident, obstetrical* misadventure, chronic illness or as a safeguard during major operative procedures If every member of a community donated 1 pint of blood once in a lifetime there would be far more blood available at blood banks than ever required If this fact was appreciated and acted upon with a sense of civic responsibility the loss of life due to unexpected blood loss would be reduced to a small fraction of its present rate in many parts of the tropics Prospective blood donors in the tropics, mainly the relatives of patients requiring *blood transfusion*, must be approached and spoken to in a sympathetic manner, having explained to them the urgency of their relative s condition and the benefit which may be derived from a blood transfusion Members of a family are much more likely to give blood when the patient is admitted to hospital in an urgently

of 20 oz, or 1 pint, in an adult This is a serious loss and the danger is increased by the high rate at which the blood is lost from the placental incision If the infant is not removed quickly such a blood loss may be fatal to the baby Rupture of a fœtal umbilical vein during childbirth is a rare accident, but if it happens the infant is usually stillborn If the child is alive and the condition is recognised immediately following delivery an immediate blood transfusion should be given The question is often asked "How much blood should be given to a baby for transfusion?" This depends to some extent on the amount of blood lost, but 6 c c per lb of body weight is the amount recommended If 6 c c per lb of body weight is used in a 10 stone adult, the amount given would be 840 c c, which is roughly 1½ pints For a 6 lb baby, therefore, 6 c c per lb body weight would be 36 c c

Pernicious anæmia is a disease of a low grade chronic character in most cases If blood replacement is inadequate by the patient's own physiological response to treatment, a blood transfusion is required This condition is not common in African patients though it may occur rarely Sickle cell crises associated with the sickle cell trait is a common occurrence as approximately 20 per cent of African patients show this trait The percentage of patients affected varies greatly in different areas With a sickle cell crisis there is usually a drop of 5 per cent per day in the hæmoglobin level This goes on in severe cases up to one week In most of these cases there is slow recovery with blood replacement during the next one to two months In some instances a blood transfusion is desirable Thalassæmia is also associated with blood crises from time to time Congenital hæmolytic disease of infants is not seen so commonly in babies in the tropics as in Europe, the Rhesus-negative factor being much lower in African patients than in Europe The figures given by Edington [1] for the Rhesus negative factor in Accra and Lagos in West Africa are respectively 6 and 4 per cent The Rhesus negative factor in Europe runs at about the 15 per cent level The most common form of blood loss into the tissues in newborn infants in the tropics is cephalhæmatoma With this condition several ounces may be extravasated into the layers of the scalp, this gives rise to a marked anæmia, but it is seldom fatal The degree of hæmodilution caused by it is seldom estimated, but it is often severe with a hæmoglobin level showing at only 50 per cent Bleeding from the umbilical stump may also cause marked anæmia and require treatment The majority of indigenous babies born in the tropics have a hæmoglobin level of slightly over 90 per cent at birth—it is seldom 100 per cent The hæmoglobin level is slightly higher if the umbilical cord is not tied immediately after delivery If the cord is not tied for two minutes after delivery the baby receives much of the fœtal blood in the placenta back into its circulation Early ligation deprives the infant of some of this blood

Restoration of blood volume can be achieved by the use of plasma transfusions Dried blood plasma was marketed for some years by commercial firms, but is now not available It was a most convenient product, as it could be kept in cold storage and made up immediately as required It did not necessitate any typing as it contained no red blood cells The various antigens which give rise to transfusion reactions of incompatibility are largely associated with the red blood cells

He noted that a drop of blood just sinks in a copper sulphate solution of specific gravity 1 053 *if it contains 12 5 gm* of hæmoglobin per 100 c c of blood Some services accept donors only if the blood contains 13 5 gm hæmoglobin per 100 c c of blood, as indicated by the drop of blood staying stationary in a copper sulphate solution of specific gravity 1 055 Enquiry is also made as to whether the person has been in contact with any known case of infectious disease within the past fourteen days The blood after donation is examined by Wassermann and Kahn tests to exclude cases suggestive of recent or old spirochætal infection The antigenic type of the blood is then determined *relative to the various main groups*—O, A, B and D factors The letter D is used to indicate the Rhesus-negative antigen

The position of possible infectivity of blood in the tropics is rather different In view of the fact that malarial gametocytes can be found after prolonged search in the blood in 20 per cent of indigenous persons in West Africa (Colbourne [6]), and probably 100 per cent have a dormant infection in the visceral tissues which is not apparent in the peripheral blood, the question of malaria assumes a different perspective Rapid examination of blood slides detects only very heavy malarial infections With the disturbance in the hæmopoietic system associated with blood loss and blood transfusion, it is advisable to give the recipient of blood in the tropics a course of antimalarial treatment following blood transfusion as a routine The strain of malaria parasites introduced with the transfusion may be somewhat different from that which the patient already harbours, and this is likely to precipitate a febrile attack In non-urgent cases it is desirable to give the prospective donor a course of antimalarial treatment before donating blood Edington [1] noted that the Kahn reaction in West African patients is to some extent positive in about 60 per cent of cases examined from the general population who are not necessarily complaining of any indisposition In only a very small fraction of the positive results is the positivity due to spirochætal infection either recent or old A weak positive Kahn reaction may be noted in patients following an acute malarial attack, and other tropical infections Where blood transfusion is undertaken as an urgent procedure, it is usually not possible to undertake a Kahn reaction on the blood Kahn reactions are seldom undertaken at all in small country stations In view of the lack of facilities for detection of spirochætal infections in most instances, it is advisable to give the recipient of blood 3 million units of long-acting penicillin during the next seven days If this is done the risk of spirochætal infections being transmitted is very remote indeed In many instances penicillin is indicated for the condition from which the patient is suffering which necessitates the transfusion The spirochætes of syphilis and yaws are killed by blood storage in acid citrate dextrose for four days Officer [7] gave five healthy volunteers blood known to contain malaria parasites, he followed this with a course of antimalarial treatment None of the recipients so treated developed malaria Thoroughman,[8] working in China, noted no malaria in thirty-four recipients of blood from residents in an endemic malaria area when quinine was given to the recipient following transfusion In a control group of recipients who were not given any quinine following [illegible] three weeks [illegible] Wood [9] [illegible] result of

ill condition than if they are called upon to do so several days later Confidence is usually increased if the opportunity is taken of speaking to the relatives while blood matching is being undertaken The fact that prospective donors are allowed to see the technique of matching and have explained to them what is being done helps them to appreciate the necessity for care and accuracy They realise more fully that blood transfusion is a procedure undertaken with precision and care to ensure safety and benefit to the person requiring it Persons are less likely to co-operate in blood donation if dealt with by subordinate members of the hospital staff than if attended to personally by the doctor in charge of the case It must be explained to the donor that the amount of blood required will not be detrimental to his own health in any way As a gesture it is advisable to give the patient a tonic of some sort following donation of blood This engenders confidence in other members of the family who will undoubtedly speak about the procedure to many persons in their home village A group of prospective donors is quite impressed when they see the appearance of compatible and incompatible blood being demonstrated

In country stations it is usual to rely on cross matching alone and not on typing on cross matching In one large West African town a most unfortunate setback to the introduction of blood transfusions was occasioned by the death of two early blood donors within one month of giving blood for transfusion One fatality was considered to be due to leukæmia and the other to lobar pneumonia In the first case the condition was not recognised at the time the blood was donated and in the other the illness was quite incidental The incident was most regrettable and was widely spoken about in the community where there was naturally a subsequent reticence to give blood for transfusion This incident occurred prior to my residence in that place

In Europe, Mollison [3] notes that it is usual to select blood donors between the ages of 18 and 65 years of age A careful history of previous illness is taken with special reference to

1 Anæmia
2 Hay fever
3 Asthma
4 Nettle rash
5 Goitre
6 Malignant disease
7 Diabetes
8 Heart disease
9 Epilepsy
10 Tuberculosis
11 Malaria
12 Jaundice
13 Stroke
14 High blood pressure

Particular attention is paid to jaundice for, according to the World Health Organisation,[4] it is considered that infective jaundice of virus origin may remain transmissible for some years following the initial attack in spite of the person being asymptomatic As many persons normally not resident in the tropics have been temporarily resident in endemic malarial areas of the world, the possibility of malaria must also be considered in them Quartan malaria may remain dormant for up to twenty years and then manifest itself when blood is donated Benign tertian malaria may also remain dormant though probably for a shorter duration of time Subtertian malaria tends to die out with residence in a non tropical area for two years in most cases The hæmoglobin level should not be below 12 5 gm per 100 c c of blood as a minimum This is estimated by Phillips s method [5]

Thalassæmic disease—

Thalassæmic trait	AT genotype (Grade 1 disease)
Mediterranean anæmia	TT genotype (Grade 2 disease)

Hæmoglobin "C" disease—

Hæmoglobin "C" trait	AC genotype (Grade 1 disease)
Hæmoglobin "C" disease	CC genotype (Grade 2 disease)

In the Grade 1 disease manifestations, in each case, if blood from the donor is transfused into a patient who has lost blood, but who does not suffer from any primary blood abnormality, the red cells transfused survive a normal time Conversely, if normal healthy blood is transfused into a patient with the trait manifestation of any of these conditions the normal blood transfused survives a normal time The trait character alone is not detrimental to the longevity of red cells either way On the other hand, if blood is taken inadvertently or for experimental reasons from a patient with any of the double genotypes such as SS, TT or CC, the red cells transfused are disrupted in somewhat less than one-third of the normal expected life span of normal cells The recipient of the transfusion is therefore little benefited Furthermore, if healthy red blood cells

derived in these double genotypes is therefore of limited value, being of short duration, and it is liable to be followed by jaundice These three forms of blood abnormality are inherited abnormalities with a dominant Mendelian character, one genotype being derived from each parent These diseases are in no way infectious

The position of the cells in cases of pernicious anæmia is very comparable to that of these three blood abnormalities, but pernicious anæmia is not a hereditary disease Mild cases of pernicious anæmia have red cells behaving very like those of the trait manifestations above mentioned The red blood cells from mild cases survive normally in the new circulation of a recipient who has lost blood but is otherwise healthy If, however, the patient suffers from a severe degree of pernicious anæmia and the red cells are injected into another individual the cells are eliminated from the recipient's circulation in one-third of the normal time Hamilton[13] found that the administration of vitamin B_{12} has the effect of decreasing the rate of destruction of normal red cells when transfused into a patient with severe pernicious anæmia Patients who have a severe degree of anæmia of any sort should not be used as blood donors and they will certainly be excluded if careful attention is paid to the hæmoglobin estimation in prospective donors Patients with any of the severe forms of hæmolytic diseases may require blood transfusion, but the benefit they derive from it cannot be expected to be as great as that seen in patients who have suffered a traumatic blood loss, but whose hæmopoietic system is basically sound

inadvertently transfusing infected blood This is not a common condition in tropical Africa or Asia, but it is being recognised with increasing frequency in recent years, most of the cases being of the type associated with low-grade bone infections The condition is noted most often in the Mediterranean area of the world

In many parts of Africa microfilariasis and trypanosomiasis are common conditions Filariasis has also a very widespread distribution in South and Central America as well as Asia and the Pacific islands One is naturally very reluctant to use blood for transfusion which is found to contain microfilaria on thick film examination, but when blood is urgently needed, particularly in obstetrical cases, and no other blood is available, Archambault [11] has adopted the practice of taking blood and examining it for microfilaria as a routine and if microfilaria are found

one-tenth of the total blood volume of the body The drug is allowed to act for one hour before the blood is used for transfusion In all cases the microfilaria have been found to be killed by this method and do not recover if added to fresh blood Filariasis is seldom a lethal disease and the urgency of a patient's condition requiring the transfusion in most cases justifies the use of blood so treated The position of blood transfusion in countries where trypanosomiasis is prevalent must also be considered Many asymptomatic indigenous persons have trypanosomes in the peripheral blood as pointed out by Akwei [10], others undertaking sleeping sickness campaigns have had the same experience The risk of transmission of trypanosomiasis by blood transfusion is considerable in areas of Africa where the disease assumes the proportion of from 1 to 10 per cent of the local population. The same risk may be encountered in South America with Chaga's form of trypanosomiasis, but the blood stream infection is of shorter duration than that noted with African sleeping sickness The use of treated blood, using Antrypol as for filariasis, may sometimes be justifiable in very urgent cases In less urgent cases the use of another donor should be considered if trypanosomes are found in thick wet blood preparations, in view of the more serious nature of trypanosomiasis

Blood from a healthy donor is eliminated from the recipient's circulation at the approximate rate of 1 per cent per day It can be reckoned that all the transfused blood is removed in 100 days from the time it is introduced into the recipient

In patients of African origin there is an average sickle cell trait incidence of 10 to 20 per cent It is obvious that a fair proportion of prospective blood donors will, therefore, show this condition In sickle cell disease there is an abnormal tendency to red blood cell destruction Thalassæmia and hæmoglobin "C" disease are comparable conditions with blood dyscrasias, and consideration of all three will be given relative to transfusion Each of these three blood abnormalities manifest themselves in a minor and a major form The minor is placed first, being in each case the more commonly encountered, though less serious

Sickle cell disease—

Sickle cell trait	AS genotype (Grade 1 disease)
Sickle cell anæmia	SS genotype (Grade 2 disease)

In many of the large towns in the tropics ruptured ectopic pregnancy is an extremely common condition In many of these cases there is at least 4 pints of blood in the peritoneal cavity Fig 50 shows blood removed from such a case The practice of autotransfusion in cases of ruptured ectopic pregnancy has been adopted personally as a routine procedure and has proved most satisfactory in cases where the internal bleeding has been of not more than five days' duration In cases of longer duration there is a tendency for the blood to hæmolyse, and if this has occurred it is probably inadvisable to use it for transfusion Blood obtained from ruptured ectopic pregnancy cases can well be used for transfusion of other patients who are urgently in need of blood The blood can be stored for three or four days without obvious detriment if acid dextrose citrate is used as an anticoagulant and preservative Autotransfusion does not give rise to transfusion reactions if given at a correct rate In these patients the practice of giving back not more than 1 litre has been adopted to avoid overloading the circulation There is therefore frequently one or two pints available which may be used for other patients Another valuable source of blood for transfusion is by bleeding patients with high blood-pressure The practice of bleeding such patients was popular many years ago The consensus of opinion now held is that the patient gains little advantage by the employment of this practice It has, however, a marked advantage for other patients who are urgently in need of blood Patients who have a known high blood-pressure usually agree very readily to having blood removed if it is tactfully suggested to them Those who have a high blood-pressure frequently say that they feel much better following the removal of blood and for this reason donate blood at regular intervals very willingly If their pressure is unduly high the transfusion services usually decline to accept them as donors

Having personally encountered great difficulty in getting blood for timed surgical cases, it was decided that the difficulty might conveniently be circumvented by admitting the patient to hospital and on the day following admission taking 1 pint of the patient's own blood and storing it in acid glucose citrate solution during the next seven days The patient during this time in hospital, prior to operation, is given large doses of iron, a high protein diet and multiple vitamins By this means the patient's blood can be improved to the extent of at least 10 per cent relative to the hæmoglobin, and after one week the blood loss is replaced by the physiological response of the body to treatment The operation is then undertaken and the patient's own blood is given back during the operating time No typing is necessary as it is the patient's own blood that is being given The great advantage of this method, conveniently termed "delayed autotransfusion," is that the blood replacement is made exactly at the time when it is most needed This method is an easy and extremely useful technique An American [illegible]ed tor[11] has recently discussed the physiological effect of iron administration at [illegible] anæmia [illegible] is obvious

Realising the difficulty of getting adequate supplies of blood for transfusions in the tropics the literature has been investigated to see if any methods have been adopted in other parts of the world which might usefully be employed The

SOURCES OF BLOOD FOR TRANSFUSION

If a patient loses whole blood as a result of any form of mishap or during timed surgical procedures, the blood loss should be made good by replacement with whole blood, if at all possible. Much of the advantage of blood transfusion is, however, due to replacement of circulating fluid to make up the original volume of the blood in the vascular field. It is primarily the loss of blood volume which causes the symptoms of shock. Replacement of blood lost by the introduction of saline alone is of very temporary benefit only, the saline is rapidly excreted. Plasma substitutes of the polyvinylpyrrolidone type are more advantageous, as with a high molecular weight they are retained in the circulation for several days. Blood serum is of enormous advantage and in many respects supplies the essential factors required when transfusion is called for. In cases of intestinal obstruction and burns the blood depletion is primarily in respect of loss of circulating plasma. In both conditions there is marked exudation of plasma from the general circulation. In many parts of the tropics where there is still great difficulty in obtaining sufficient blood for transfusion purposes there is a tendency to allow prospective donors to go away if the blood is not found compatible on cross-matching. If blood is donated even though incompatible, it may well replace suitable blood already retained in a blood bank. The patient requiring the blood may be supplied from blood of the correct type already in the bank. In small stations where there is no blood bank it should still be remembered that the blood of an incompatible donor may still be taken with advantage, for it is the red blood cells which carry the antigens causing incompatibility. The serum when separated is, however, still very valuable for transfusions and it can be given without typing as soon as adequate sedimentation of the blood has occurred, permitting removal of the serum without admixture of red cells. In many instances the patient is much benefited by a serum transfusion alone. Whereas whole blood of the correct type is most beneficial, serum is a great advantage and should not be lightly disregarded. The serum of a donor can be given to any patient without typing, it may in rare cases cause a serum type of reaction, but compatible blood may also do this. Serum reactions of the allergic type are seldom very serious and can be controlled by a small dose of intramuscular adrenaline. During World War II, when blood transfusion services were highly organised in Europe to cope with the requirements of military and civil populations, there was a large excess of blood donated which was frequently not required. To avoid loss of valuable blood the clear serum was removed and dried, being subsequently stored and sold as a commercial product to save total loss. Much of it was sent to areas of the world where transfusion services were yet not well organised. This dried serum made up with normal saline was most useful as no typing was necessary and adequate stocks could be held for a prolonged time in remote places. It is advised in these circumstances that blood should be taken from donors in all circumstances, irrespective of their blood group, and if the type of blood is not suitable for the requirements of the patient needing the transfusion the serum should be taken off after adequate sedimentation and used as a serum transfusion.

If voluntary blood donors cannot be obtained to give blood as required, other sources of blood must be looked for to circumvent the difficulties encountered

have been set out in a concise and clear manner by Burrows [17] The various types of reaction have been divided into six groups

1 Hæmolytic, causing backache, dyspnœa, shivering, *shock and urinary* suppression
2 Allergic, causing urticaria, angioneurotic œdema and joint pains
3 Pyrogenic, causing pyrexia, rigors and cyanosis
4 Infective, causing cerebral flushing, pyrexia and vomiting
5 Cardiovascular, causing dyspnœa and coughing of frothy blood stained sputum
6 Disease transmission, causing evidence of the disease some days later

Hæmolytic reactions are due to destruction of the donor's cells by the serum of the recipient Allergic disturbances following transfusion are due to the protein of the donor's serum being unsuitable to the recipient, this type of reaction is less common than the hæmolytic type Pyrogenic reactions are thought to be due to chemical substances derived from the glass of the apparatus and from extraneous particles, usually of a protein nature, which are residual in transfusion apparatus following the previous transfusion These particles are sterile but none the less they produce a reaction in spite of their microscopic size Rubberware may cause reactions and for that reason it is advisable, if possible, to use special plastic transfusion tubing now made for that purpose To decrease the risk of pyrogenic reactions apparatus should be dismantled immediately after use and put into a large container of water It is, in fact, advisable to put a bucket of water under the patient's bed for this purpose before the transfusion is started If the apparatus cannot be washed out immediately after use the submersion in water decreases the risk of adhesion of blood clot about the joints of the apparatus A serious form of reaction is that due to overloading of the cardiovascular system of the recipient who may be in poor physical condition at the time of the transfusion This is most likely to occur in patients who are suffering from chronic anæmia but who have not lost blood volume prior to the transfusion due to hæmorrhage To decrease this risk a packed cell transfusion is advisable in these cases of anæmia without decrease in blood volume The rate of a blood transfusion should be regulated in each case according to the requirement of the patient and the nature *of the condition present* If a drop indicator is used in the transfusion system overloading reactions are much less likely to occur Reactions due to contamination of blood are rare where a transfusion is given immediately the blood is removed from the donor, if the blood is stored it is much more likely to happen The risk of contamination of the blood is greatly increased if bottles of stored blood are opened for sampling on several occasions To avoid unnecessary opening of stored blood a small " pilot " bottle is attached to the neck of the large bottle so that if sampling is necessary for cross-matching the blood in the small bottle can be used, thus avoiding opening the main supply unnecessarily Great care must be exercised to avoid contamination of the blood when it is being withdrawn from the donor Transmission of disease by transfusion may be considered a form of reaction, but this should not happen if healthy donors are used Where there is infection present of a treatable type and no other donor is present to give blood

most valuable contribution on the subject was found in the Russian journa[l] Speranskya [15] indicates that he has employed placental blood for transfusi[on] during the past twelve years with much satisfaction It will be appreciated that t[he] fœtal circulation is virtually separate from the maternal circulation and whereas t[he] blood of the fœtus obtains oxygen from the blood of the mother by diffusion the union of the two vascular systems is in the nature of an interdigitation betwee[n] the chorionic villi of the placenta and the blood sinuses of the maternal uterine wall The union may be compared to the adaptation of the fingers of the right hand between those of the left When the baby is born the two systems separate and the infant starts to breathe thus instituting its own pulmonary oxygenation Following childbirth the placenta is discarded If, however, the placenta is washed and placed in a ring like stand of the retort holding type with the umbilical cord hanging down from it, the cord can be cut across again and a quantity of blood will drain from it Between 150 and 300 c c of blood can be drained from each placenta in this way The blood after typing can be used for transfusion if it is compatible with that of the patient requiring it By this method Speranskya collected on an average 100 litres of placental blood annually at a large maternity hospital The risk of sepsis is small if the placenta is carefully washed and the blood then collected with all due precautions It is considered advisable to give penicillin following blood transfusion by this method

Fœtal blood normally contains about 16 6 gm of hæmoglobin per 100 c c of blood It is, therefore, equally beneficial to adult blood for transfusion If one-third of a pint of blood is obtained from each placenta drained, the amount of blood obtained should be sufficient in most country hospitals for the occasional blood transfusion which is required for urgent cases at least

Gelatine solutions can be used as a blood plasma substitute Artz, Howard and Frawley [16] used 3 per cent solutions in the treatment of hypovolæmic shock in battle casualties in Korea because it obviated the necessity of blood typing under very urgent conditions If a 10 per cent solution is used only 30 per cent is excreted during the next forty-eight hours If a 3 per cent solution is used 80 per cent. is excreted during the following two days The molecular weight of gelatine [i]s about 50,000, and for this reason it is retained in the circulation much longer [t]han saline solutions "Plasmoid" is a gelatine blood substitute (5 per cent [so]lution marketed in America) Gelatine solutions can be sterilised by autoclaving [an]d they keep well without discoloration for up to six months

BLOOD COMPATIBILITY AND INCOMPATIBILITY

Some of the earliest blood transfusions given to man failed because of a lack [ap]preciation of the various primary blood groups which are now known to

Only with the discovery of these antigenic factors and the importance of [d]etection relative to transfusion reactions has the procedure been made safe [e]ssential before undertaking a blood transfusion to ensure the compatibility serum of the patient and the red cells of the donor For this purpose a [m]atching test should be carried out The main hazards of a blood transfusion

The minor advantages gained are offset by the loss of time involved Cross-matching in saline alone is adequate for requirements Incompatibility of major blood groups causes reaction within five minutes of the start of the transfusion and is usually quite obvious In very few cases will the patient have received more than 100 c c of blood by this time Burrows[17] makes the important observation that where incompatible blood is given inadvertently no deaths occurred in any cases noted where less than 350 c c had been given He also observed that no recoveries took place where the recipient received 500 c c or more of incompatible blood If any doubt exists as to the compatibility of the blood on cross-matching and no other blood is available in urgent cases, the blood may be given and the patient watched by the doctor himself so that the transfusion can be stopped immediately if there is any indication of a reaction

Wiener[18] suggested a biological method for use in special cases where incompatibility due to minor groups was suspected A sample of the patient s blood is first taken and allowed to settle so that the colour of the serum can be noted Blood is taken from the donor and 50 c.c given intravenously to the patient After one hour, if there is no obvious reaction, a second sample of the patient's blood is taken and the colour of the serum examined to see if there is any change in colour suggestive of hæmolysis If there is no change in the colour of the serum a second 50 c c of the donor's blood is given to the patient intravenously and after a further hour another specimen is removed from the patient and the colour of the serum examined to see if there is any indication of hæmolysis present as judged by the colour of the serum If after injection of 50 c c of the donor's blood on two occasions at an interval of one hour each no hæmolysis is apparent, it can be taken that the bloods are compatible

The method is of interest and is therefore mentioned, but there is no reason why it should replace the safer method of cross-matching if saline and citrate are available Possibly in remote places citrate solution may not be available The method would not be accepted where facilities are available for more precise and safer techniques

Closely allied to this biological method, however, is the technique of detecting recipients who have an inborn allergic tendency by intradermal blood inoculation In these patients, who may give a history of asthma, hay fever or urticaria, an allergic reaction sometimes occurs in spite of the blood cross-matching showing no incompatibility This is due to the action of the donor's serum on a hypersensitive patient with reagin antibodies in his serum The likelihood of allergic reaction can be demonstrated if the patient is given an intradermal injection of his own blood in the skin of the right forearm as a control and in the other forearm an intradermal injection of the prospective recipient's blood If there is an allergic tendency a large weal of the urticarial type will be produced within half an hour at the site of injection of the donor's blood, but not at the control site If this is noted antihistamine drugs should be given with the transfusion or another donor selected Tests of this type are seldom undertaken as allergic reactions are rare, but they are advisable in cases where the patient has a known asthmatic tendency

Whereas the Rhesus negative patients constitute a 10 to 15 per cent incidence in Europe, the incidence of the Rhesus-negative factor is noted in only 5 per cent

in very urgent cases, the appropriate antidote to the infection should be given with the transfusion to control the infection present, this matter relative to tropical diseases has already been given some consideration

The most satisfactory method of arriving at a conclusion as to the suitability of blood for transfusion is to undertake cross-matching This gives no indication of the type of blood of either the recipient or the donor, but it does mean that the blood is suitable if no agglutination takes place on mixing the patient's serum, normal saline, sodium citrate solution (3 8 per cent) and the donor's blood Cross-matching is a very easy procedure A clean glass microscope slide is taken and on it are placed at four separate positions the above components On mixing, the result is observed If there is gross incompatibility there will be within one minute an obvious and rapid clumping of red blood cells giving an appearance suggestive of ground cayenne pepper added to a few drops of water If blood is incompatible the clumping should be obvious within a maximum of three minutes If blood is compatible the suspension of blood will remain approximately evenly distributed throughout the slide for up to half an hour It is usually quite safe to use blood which shows no obvious incompatibility after five minutes Although blood is cross-matched between the recipient and the donor, a reaction may still occur in approximately 2 per cent of patients Those patients who show such an allergic reactive phenomenon usually have previously shown evidence of asthma, hay fever, angioneurotic œdema or urticaria Reactions of this type are best controlled by the use of antihistamine drugs such as a dose of 25 mg Benadryl If allergy is suspected before the transfusion is started, it is advisable to add a dose of 25 mg pyribenzamine in 2 c c of distilled water to the blood before the transfusion is started

Whereas it is useful in maintaining a blood bank to type the blood donated so that a suitable type can be selected with the minimum loss of time, it is still desirable to cross-match the blood of the donor with the serum of the prospective recipient Blood typing detects the major blood groups, but secondary minor groups may still be present giving rise to incompatibilities Cross-matching is the most satisfactory method of finding a suitable type of blood for transfusion In warm climates it has been found as a matter of personal experience that samples of known type serum do not remain potent for more than three or four months, and if they are needed on rare occasions only they may well have deteriorated by the time they are required and are therefore unreliable Recently a Danish firm * has marketed "Eldon" cards for blood grouping These are sealed in tinfoil and keep for up to two years at room temperature These cards may be a practical suggestion for those working in the tropics with very limited laboratory facilities The sera are marked according to the antibody they contain—anti-A, anti-B and anti D (anti-Rh) and not the name of the blood types of the sera concerned Extra caution in use is essential till the method of nomenclature becomes familiar

Blood grouping of donor red cells with replacement of the serum by albumin solution is a refinement in technique which is not necessary in small stations

* Nordisk Insulinlaboratorium, Gentofte, Denmark London Agents H M Langton & Co Ltd, 8 Bloomsbury Square, London, W C 2

DONATION AND TRANSFUSION OF BLOOD

Having selected a suitable blood donor little difficulty is usually anticipated in obtaining a sufficient quantity of blood for the purpose for which it is required If only a small quantity of blood is required for transfusing an infant or small child the easiest method of obtaining it is by the use of a serum needle and a 20 c c syringe attached The quantity of blood required is only 30 to 100 c c , depending on the size and age of the child For adult patients it is usual to take not less than 1 pint of blood as a suitable donation Not more than a maximum of 1 litre should be removed from a healthy adult donor As it takes from ten to twenty minutes to remove 1 pint of blood through a wide-bore needle, there is a tendency to note a decrease in the rate of blood flow as the donation proceeds The first third of a pint is withdrawn easily, the second third with some difficulty and the remaining third often with considerable trouble In order to obtain blood quickly and with the minimum of clotting, several methods have been devised The citrate solution decreases clotting, but does not abolish it completely The use of negative pressure in closed receiving systems, such as a triangular flask with side tube attached, has been found very helpful The Keynes blood transfusion set has been designed for this purpose This excellent piece of equipment has been used personally for many years with satisfaction A special negative pressure bulb is supplied with the equipment in order to extract air from the flask and so encourage blood to flow into it from the donor By modifying the length of the tube passing through the rubber stopper the apparatus can be employed as a " giving " as well as a " taking " set *To use the equipment as a giving set is rather time-consuming, necessitating* the personal attention of the doctor, and so the apparatus is used more frequently as a means of extracting the blood from the donor rather than of giving it to the patient It is usual therefore to transfer the donated blood to a giving set which allows the blood to flow into the patient under the influence of gravity A blood taking set of the Keynes type can be made up easily either with a triangular flask or by adapting a discarded Vacolitre bottle If a negative pressure bulb is not available a Higginson's syringe can be used by attaching it in the reversed direction to the extractor opening of the system A negative pressure can also be produced by attaching a well-fitting metal ear syringe to the extractor opening

To obstruct the venous return from the arm in order to fill the peripheral veins a sphygmomanometer is most suitable By this means the pressure can easily be regulated The optimum pressure to be maintained is 80 mm of mercury This obstructs the veins without seriously interfering with the entrance of blood into the limb beyond the arm band

If an immediate blood transfusion is anticipated after the blood is donated, sodium citrate solution (3 8 per cent) is suitable to prevent clotting This can be obtained in large ampoules of 100 c c ready for use This amount, in this strength, is adequate for addition to 1 litre of blood Citrate solution supplied in this way minimises the risk of infection If blood is taken with a view to giving a transfusion some days later, it is advisable to use acid dextrose citrate solution, as this preserves the blood and keeps the red cells alive

of African patients, it is, therefore, not a very serious factor The trait is less serious in a male than in a female patient It is seldom that a male patient, even if he is of the Rhesus-negative type, requires a second blood transfusion, so that although he may be sensitised by the first transfusion of Rhesus positive blood, he suffers no ill effects In the case of female patients it is much more important because of the recurrent risk occasioned by pregnancies A Rhesus negative woman may also become sensitised by a Rhesus positive baby she is carrying A Rhesus positive transfusion given to a Rhesus-negative woman late in pregnancy is very liable to precipitate labour

If in a patient having a blood transfusion reaction the respiration and pulse are not unduly affected, it is not essential to stop the transfusion Many mild reactions can be treated effectively by giving intravenous calcium gluconate solution (5 c c of 10 per cent) and aspirin (15 gr) by mouth with a hot drink Additional blankets should also be given to the patient To avoid this type of reaction it is helpful to add 10 c c of calcium gluconate 10 per cent to the blood being given at the start of the transfusion Pyrogenic reactions due to inadequately washed blood transfusion apparatus are the most common types of blood transfusion reactions in the tropics it would appear Edington [1] suggests that blood transfusion should not be used on more than five occasions in all, after this it should be discarded altogether Plastic expendable transfusion sets can be purchased They are used only once and are then discarded If an excess of citrate solution is added to the blood there may be a pyrogenic reaction due to this cause The addition of 100 c c of 3 8 per cent solution is adequate for 1,000 c c of blood, giving a final citrate solution strength of 0 38 per cent, which is adequate for the

is given after donation, but if blood is to be kept it is advisable to use acid dextrose citrate solution made up as follows

Disodium citrate	2 gm
Dextrose	3 gm
Water	30 c c

(Loutits' [19] solution suitable for mixing with 510 c c of blood)

The dextrose decreases the risk of infection in the blood and also supplies nutrition to the red cells thus making it possible for them to remain alive for up to two weeks at least If dextrose is not added the red blood cells die within seven days If the cells are dead when transfused, they are rapidly disintegrated and so become useless Patients are much less likely to develop transfusion reactions if given alkaline drinks—sodium bicarbonate and glucose solution—for some hours before the blood is given If a hæmolytic transfusion reaction occurs it is advisable to give 100 c c of 10 per cent glucose intravenously This promotes diuresis which is beneficial as one of the most serious end results of hæmolytic reactions is urinary suppression with uræmia

is in poor condition with a low blood-pressure, it is very difficult to enter the lumen of the arm veins. In these cases it is advisable to make a small opening over the vein and tie in a metal cannula through which the blood can be given. Even though blood is well citrated the rate of flow often slows as the transfusion proceeds. If there is no local swelling in the arm about the area of insertion of the needle, suggestive of the needle having left the vein, it is an advantage to add a positive pressure to the column of the blood. To do this a positive pressure pump is attached to the opening of the air vent tube entering the transfusion bottle and the bulb pressed a few times. By this means the blood passes through the system more quickly. The rate of increase can be noted by the drop indicator. Positive pressure should not be used when the last quarter of the transfusion is being given because of the risk of producing an air embolism in the event of the blood going below the level of the glass tube conducting the blood from the bottle to the patient.

No conspicuous advantage has been noted in patients with the use of intra-arterial blood transfusion where this method has been used on a few occasions. If venepuncture is used for taking or giving of blood a pressure dressing should be applied over the site of puncture of the respective veins. If an open dissection is made in the recipient's arm for the introduction of the blood, one loose suture should be put through the skin edges of the wound and left long so that it can be tied after the transfusion is completed. A long loop is tied to prevent the ligature being displaced before the wound is closed. Where a padded wooden splint is used on the arm to keep it in the straight position, care must be exercised to avoid obstructing the veins through which the blood is entering. The use of the long saphenous vein, over the position of the internal malleolus of the ankle joint, is suitable for introduction of the blood. If this vein is used no leg splintage is necessary. A sheet put over the knee position and tucked under the mattress is usually sufficient to retain the limb in position. By the time the patient wakens after an operation in most cases the blood transfusion will have been completed. The practice of allowing patients to return to the wards in a wakeful state following operation has not been encouraged, as it predisposes to vomiting and sometimes struggling while the patient is on the way back to the ward. The nurse in charge of the patient being returned to the ward has often only limited experience. It is considered safer to let the patient waken up in bed.

REFERENCES

1. EDINGTON, G. M. (1956). *Some observations on blood transfusion in the Gold Coast.* *W. Afr. med. J.* 5, 71.
2. GREEN, D. M. & METHENY, D. (1947). Estimation of acute blood loss by the tilt test. *Surg. Gynec. Obstet.* 84, 1045.
3. MOLLISON, P. L. (1956). *Blood Transfusion in Clinical Medicine*, 2nd ed., p. 1. Oxford: Blackwell.
4. World Health Organisation (1953). First Report of Expert Committee on Hepatitis. *Wld Hlth Org. techn. Rep. Ser.* No. 62.
5. PHILLIPS, R. A. *et al.* (1954). *Copper Sulphate Method of measuring Specific Gravities of Whole Blood and Plasma.* New York: Macy Foundation. (Quoted Mollison, P. L.)
6. COLBOURNE, M. (1956). The effect of prolonged examination of blood films on the parasite rate. *W. Afr. med. J.* 5, 26.

Many of the standard blood transfusion needles are not more than 2 in in length Because of their shortness, it is necessary to attach a rubber tube to them in order to conduct the blood into either an open receptacle or any form of closed system The addition of rubber tubing and multiple joints greatly increases the risk of clotting despite the citrate solution added If this happens the rate of blood flow is impeded, so making it more difficult to get the second half-pint of blood than the first Any method or technique which is simple, safe and efficient commends itself, particularly in parts of the world where it is difficult to replace damaged apparatus quickly For this reason much the most simple method of obtaining blood from donors is to use a Greenbury needle (Fig 200) alone for removal of the blood (Allen & Hanburys, London) This needle is 5 in long and of 14 wire gauge calibre Using this long wide-bore needle no rubber tubing at



FIG 200
Blood being removed from a blood donor using a Greenbury needle (5 in 14 S W G)

all is required, nor is a negative pressure system needed In a patient with good veins the needle can be introduced without difficulty when attached to a 20 c c syringe The syringe has citrate solution in it so that after it has acted as a handle to facilitate the introduction of the needle, a few cubic centimetres of the citrate solution can be introduced to citrate the inside of the needle before the blood is allowed to flow out itself after removal of the syringe With this needle blood can be obtained without difficulty and 1 pint collected in approximately twelve minutes in almost all cases Fig 200 shows the needle being used with blood flowing directly into a wide mouthed bottle The great virtue of the needle is that it is sufficiently long to clear the skin of the arm, so allowing the blood to flow directly into the bottle without attachment of any rubber tubing This large needle if inserted with deliberate and decisive action is not more painful than one of a smaller size In most adult patients the antecubital vein is suitable for withdrawal of blood, any large vein may be selected The veins at the back of the hand are less suitable for taking blood than giving it The same can be said of the external jugular vein which is sometimes used to give blood If a patient requiring blood transfusion

21

Principles of Traumatic Surgery

THE INJURED PATIENT

BECAUSE of the wide range and varying nature of violent accidents and the numerous injuries which result from these, it is more important, in dealing with the subject of traumatic surgery, to consider the general principles involved rather than the management of individual conditions Certain types of injury which are seldom seen in temperate climates, but are encountered from time to time in tropical countries will, however, be discussed briefly Such conditions as the " burst gun " hand injury seen almost exclusively in hunters in the tropics requires consideration Arrow wounds are still seen in certain areas and these are very dangerous Rupture of the spleen, so commonly encountered, has already been dealt with earlier Snake venom poisoning and bites of venomous insects as well as those of large animals are dealt with in Chapter 23 Crocodile bites are quite commonly seen in certain areas adjacent to the large rivers in the tropics

Fractures and suture of wounds are the two conditions for which patients are most frequently admitted to surgical wards Obstetrical emergency cases are also very frequent, they have already been considered

Following any serious accident there are four main types of disturbance noted in injured persons, these are

1 Disturbance of co-operation due to pain and fear
2 Disturbance of blood volume resulting from hæmorrhage, visible or concealed
3 Disturbance of physiological function, exemplified by the open chest wound
4 Disturbance of anatomical structure, laceration of soft structures and fractures

Considering this very general classification of the effect of injuries on patients brings into prominence the necessity for treatment along four particular lines of approach In more popular language it can be said that the patient is suffering from pain, loss of blood, his body cannot function normally and there is a varying degree of structural damage Loss of life soon after the receipt of injury is most often due to damage to the brain or heart and large blood-vessels Patients so injured often die at the site of the accident Those brought to hospital have less critical injuries and in these cases a patient's life may be saved by prompt and efficient treatment, while it may equally well be lost by dilatory and ineffective measures If seriously injured patients are not dealt with promptly they are likely to die The effect of trauma on the body is disruption of the tissues close

7 OFFICER, R. (1945) Experimental transfusion with malaria infected blood *Med J Aust* 1, 271
8 THOROUGHMAN, J C (1940) Malaria transmission by blood transfusion *Chin med J* 58, 682
9 WOOD, E E (1955) Brucellosis as a hazard of blood transfusion *Brit med J* 1, 27
10 MENO BRITO, M A (1948) First International Conference on Brucellosis *Editiones del hospital General*, p 707
11 ARCHAMBAULT, H A (1958) Filariasis and blood transfusion in Ghana Personal communication
12 AKWEI, E (1952) Planning the control of sleeping sickness *Trans roy Soc trop Med Hyg* 46, 437
13 HAMILTON, H E *et al* (1954) Accelerated destruction of normal adult erythrocytes in pernicious anæmia *J clin Invest* 33, 191
14 Editor (1956) Transfusion and the hæmoglobin content *J Amer med Ass* 162 (11), 1020
15 SPERANSKYA, L M (1957) Gathering placental blood and using it in obstetric practice *Akush Ginek* 4, 105
16 ARTZ, C P, HOWARD, J M & FRAWLEY, J P (1955) Clinical observations on the use of
Surgery, 37, 612
r J Med 3, 99
Hæmolytic transfusion reactions II
Amer J clin Path 12, 241
disodium citrate glucose mixture as

injury has been sustained Pain is the greatest indicator of injury It is desirable in all accident cases coming to hospital to administer some form of sedative The most suitable form of sedative to give is decided upon after a very brief preliminary examination of the patient As it is undesirable to give morphia in cases of head injury or open wound of the chest, these two possible injuries should be looked for first of all If such injuries can be excluded, and this takes only a few moments to decide, morphia ¼ grain in adults should be administered INTRAVENOUSLY, in adolescent patients ⅛ grain is sufficient In children between the ages of 5 and 10 years $\frac{1}{16}$ grain of morphia is quite sufficient Intravenous morphia should not be given in younger children Morphia is both safe and efficient for the rapid relief of pain in accident cases and is advised in all cases where head injury and open wounds of the chest can be excluded The intravenous route of administration is advocated in all cases as where patients are suffering from a degree of shock, the peripheral circulation is poor and the rate of absorption of drugs injected into the tissues, other than intravenously, is very slow , it is therefore not very effective as a *sedative by intramuscular administration If there has been a severe injury about* the lower jaw, measures must be taken to maintain a clear airway if the patient himself cannot control the tongue adequately

The next most important examination is for the detection of active hæmorrhage If the patient is still bleeding, first aid measures should be adopted immediately to arrest this—local pressure dressing or tourniquet and dressings in severe cases One of the most serious and urgent requirements in accident cases is the arrest of hæmorrhage and early replacement of blood lost Patients are much easier to examine after a sedative has been given and urgent hæmorrhage arrested , the patient should then be well covered with blankets and heated up as far as possible for at least fifteen minutes During this time an injection of penicillin can be prepared and administered One hundred thousand units is suitable as an initial dose After fifteen minutes' rest the patient can be examined much more easily and with less discomfort to him Penicillin is one of the most useful wide-range antibiotic drugs for use in accident cases, its principal virtue being its effective action against anaerobic organisms, gas gangrene germs, etc On the investigation of war wounds, which are very comparable to road accidents, it was found that open injuries contained anaerobic bacilli in 80 per cent of cases Gas gangrene is a serious risk in all wounds following road accidents

There is a tendency where one serious injury is detected at one site to neglect examination of other parts of the body because of the apparent urgency of the most obvious wound It is advised that while the patient is in the casualty department all parts of the body should be examined quickly, even if not very thoroughly Each of the four limbs should be moved carefully , pressure can be exerted on the lateral aspects of the pelvis and the chest wall to see if discomfort [illegible] to see if this

[illegible] the

[illegible] The

areas indicated can then be examined with greater precision Fractures about the shoulder joint are particularly likely to be overlooked If such a routine is adopted major injuries will be detected in almost all cases at the time the patient is first

to the site of the force applied, this is in the nature of crushing or cutting. This breakdown of tissue layers permits of the escape of tissue fluids from the intracellular spaces and small blood-vessels and there is a loss of blood. Infection is admitted with the receipt of the wound.

Mechanical effects are also produced in some instances such as cardiac tamponage or pressure on the surface of the heart by blood in the pericardium or pleural space. The heart is compressed and is therefore unable to fill properly, there is a corresponding decrease in cardiac output and so failure of the peripheral circulation. The coronary blood supply is sometimes compressed with fatal results. Multiple fractures of the lower jaw predispose to inadequate control of the tongue with resultant interference with the entrance of air into the larynx by obstruction of the vital airway. Perforating wounds of the chest wall are followed by a variable degree of pulmonary collapse and inadequate ventilation. If the intestinal tract is damaged by perforating wounds, there is a leak of intestinal contents into the peritoneal cavity, causing early paralytic obstruction and virulent peritonitis. Injuries of the urinary tract also have very serious consequences, particularly if the urinary bladder is injured.

In many parts of the tropics there is a conspicuous seasonal incidence in the occurrence of certain types of accident. During the " trade season " when local harvests have been reaped and crops are being sold, there is a movement of the people to the large towns for the purpose of purchasing the goods they require urgently. Transport services not being highly organised predisposes to the carrying of large numbers of people in open lorries. There are many lorry accidents with mass casualties where up to sixty persons are involved, thirty in each of two colliding lorries. On occasions twenty or thirty persons are admitted to hospital following one accident. Dealing with such a large number of injured persons, all arriving within a few minutes of each other, is quite difficult in small stations where facilities and bed accommodation are both very limited. Some suggestions are presented from experience of such situations which may be useful to others.

The season of " the rains " shows a relatively high incidence of accidents due to falling of mud walls during heavy rains and high winds in tropical storms. Patients so injured are very liable to sustain internal injuries and fractures. Rupture of the spleen is particularly common and unfortunately is easily overlooked if a patient suffering from this condition is found to have sustained a fracture of a femur or other more obvious injury in addition. Many of these patients are children who sleep heavily and are not awakened by the wind and the rain. Injuries by falling trees are also more common during the rains than in the dry season. These accidents are also frequently associated with fractures and internal injuries. Lightning burns are noted most often during the rains also and although not very common give rise to very strange patterns of injury. A fair number of fractures of the forearm are seen in adolescent persons during the rains as a result of climbing trees to collect fruit. When in the tree they are attacked by ants and fall as a result of hurried efforts to get away from these biting insects.

Considering the factor of pain and fear following accidents, it can be said that almost all patients brought to the hospital following injury are suffering from pain. Those who sustain accidents and do not have pain conclude that no serious

SHOCK IN ACCIDENT CASES

The term shock is used to denote a state of marked depression of the vital centres which occurs as a result of damage to any part of the body There are *four main types of shock* which are well recognised They are each of a different origin and are caused by quite different mechanisms, it is therefore necessary to indicate the four types of shock which occur

1 A *primary nervous response* exhibited by fear and fainting
2 Blood volume deficiency caused by frank hæmorrhage, visible or concealed
3 Chemical or histamine shock due to the vasodilation effect of histamine
4 Cardiac shock where there is circulatory failure secondary to direct pressure on the heart

Primary shock improves rapidly after the immediate pain and alarm of the accident have passed off It is *greatly improved by heat, the recumbent position,* rest and sedatives The patient is also helped by reassurance With such treatment primary shock should disappear within not more than three hours If there is still evidence of depression of vital centres after three hours it can be confidently affirmed that there is some degree of secondary or hypovolæmic shock present as a result of loss of blood volume Hypovolæmic shock is due either to visible hæmorrhage from open wounds or concealed bleeding into the tissue spaces where *loss of blood is not apparent This is noted in such cases as fracture of the pelvis* where the loss of blood into the extraperitoneal tissues about the pelvis and lumbar region is most extensive The bleeding comes from tearing of the pelvic veins in cases of fracture of the pelvis In rupture of the spleen the hæmorrhage is also concealed, it occurs into the peritoneal cavity Loss of blood volume is the greatest cause of serious shock and it is essential to replace the blood lost to counteract it efficiently All other measures are of secondary importance to this *principle*

Chemical or histamine shock is exemplified by cases of burns where serum is exuded with blister formation and is also lost into the tissue spaces It is also seen in cases of viperine snake venom poisoning, particularly in the tropics, where there is a massive exudation of serum close to the site of the bite and within twenty four hours extending up the limb involved if active treatment has not been undertaken to localise the venom by refrigeration Surface vesication occurs and extensive *swelling of the limb is noted It is seen on rare occasions in a condition of scorching* of the soles of the feet in the tropics where those used to wearing shoes walk on [illegible] soled shoes It causes a marked fall in blood pressure, [illegible] feet about forty eight hours later [illegible] Details of a case are given later in this chapter In intestinal obstruction there is a marked exudation of tissue fluids into the lumen of the bowel due to a histamine reaction in the tissues of the bowel which is involved in the obstructive lesion The bowel content has a high histamine level, there is a fall of blood pressure with cold clammy sweating and an appearance of dehydration The condition is very often fatal if the blood volume is not restored as well as the necessary surgery undertaken for the relief of the

examined In stations where no X-ray facilities are available, very useful information can be derived by the systematic use of a tape measure or even a piece of bandage held firmly in the fingers and stretched between fixed anatomical bony landmarks, to compare the length of symmetrical parts

Regarding other sedative drugs, it is suggested that the next most useful to have available are Pethidine, dosage 50 to 100 mg, Largactil (chlorpromazine) 50 to 100 mg and paraldehyde 5 to 10 c c All these drugs can be kept ready for use in sealed ampoules Pethidine is given intravenously in accident cases and is very effective and safe It does not depress respiration and is, therefore, suitable in cases of head injury and open chest wounds Largactil should not be given intravenously except in very diluted solution when it is added to intravenous infusions of large volume Largactil is very suitable in cases where there is a marked element of fear present, as it produces a marked sense of indifference to surroundings and circumstances Paraldehyde is very suitable in cases of head injury where the peripheral circulation is reasonably good, the patient not having lost a lot of blood The dosage is 5 c c for patients under 10 stones and 10 c c for those exceeding this weight No cases of abscess formation have been noted following the use of intramuscular paraldehyde injections

Barbiturate drugs, though of enormous value in certain cases, have a limited use in traumatic surgery They are very effective sedatives, but they have the disadvantage of causing some depression of respiration, and it is difficult to administer a good general anæsthetic following their use A small dose of intravenous pentothal before general anæsthesia is popular for timed surgery, but in these cases the patient is not suffering from shock when the pentothal is given The most serious disadvantage of barbiturates in traumatic surgery is the fact that they lower the blood-pressure and this is particularly detrimental to patients in an already shocked condition. It is thought wise to avoid the use of barbiturate drugs altogether in cases of acute trauma

The most suitable sedative for young children under the age of 5 years is nepenthe, 2 minims per year of age, the standard dose of 1 minim per year of age is not considered sufficient This preparation can be measured with a glass dropper, and as the total dose is very small the child usually retains it well and swallows it with saliva during the next few minutes Sedatives given to young children in large doses when they are frightened and suffering pain are not likely to be retained, and they usually decline to swallow them Infants require rather small doses of sedative after the initial excitement of the accident passes over, as they normally sleep much more easily and heavily than adults

In all casualty departments 4 per cent cocaine eye drops should be available Cocaine eye lamellæ are a suitable alternative and keep better than the solutions Eye injuries are not effectively sedated by morphia alone Some form of local anæsthetic should be used for eye cases

A supply of wooden splints should be kept in readiness for fracture cases for not only do they give early retentive support to fractures of the limbs, but their early application reassures the patient, helping him to feel that treatment is being started and every effort made to avoid further damage to the injured limb

2. Polyvinal synthetic preparations such as Dextraven which is more effective
3. Plasma is very effective if available
4. Whole blood of the correct blood type is highly efficient

To avoid loss of time in blood replacement in casualty work, it is advised that if at all possible, at least 1 pint of type "O" blood should be kept available for use in emergency cases, so that it can be given immediately without typing being necessary. The use of blood typing cards has been recommended to facilitate grouping and these can be purchased as a *commercial product (see Blood* Transfusion).

Yi-Din [1] has recently contributed an interesting article in which he recommends *the use of intra arterial 10 per cent sodium lactate* as a means *of* raising the blood-pressure in cases of traumatic shock. This substance is given in a dose of 1 c.c. per kilo of body weight. A patient of 10 stones, or 140 lb., would require 64 c.c. of the solution. A patient of 1 stone, *i.e.*, 14 lb., would require 6 c.c. This substance given by the intra arterial route rapidly mobilises the tissue fluids into the circulatory field and assists greatly in producing a hæmodilution with restoration of blood volume. Hæmodilution normally takes place as a physiological response over the forty-eight to seventy-two hours following blood loss. This method of expediting the process is a valuable contribution to the problems of traumatic shock and is a particularly valuable suggestion for use in places where there is difficulty in obtaining adequate supplies of blood for transfusion.

TIMING OF DEFINITIVE SURGERY

[illegible]

to the surgical ward. An early blood transfusion is desirable in many accident cases and this should be started as soon as possible with type "O" blood kept in reserve for such cases. Penicillin should be given if not already administered, in view of the risk of gas gangrene. Anti gas gangrene serum is now considered obsolete and superfluous if penicillin is available. Antitetanic serum, 10,000 units, should be given where open wounds have been sustained.

It is necessary to restore the blood volume before an anæsthetic is given for reparative surgery; if this is not done the patient is liable to collapse soon after the anæsthetic is started. If blood of a suitable type cannot be obtained for the patient, plasma substitutes help considerably and are a useful alternative even though they are less efficient than whole blood. Operation is best undertaken *six hours after the patient is admitted* as a general rule. This allows time for recovery and preparation of the patient for theatre, some sedation, X ray examination and blood transfusion where necessary. After six hours in hospital the patient is unlikely to have food in the stomach and is therefore in a more suitable state for the administration of a general anæsthetic than soon after admission. Earlier operation should, however, be undertaken in cases of perforating wounds of the abdominal wall whether by stabbing or gunshot injuries. In such cases

obstructive condition Both measures are essential either alone is insufficient to deal with the critical condition of the patient Blood transfusion should be considered an essential in the treatment of shock associated with intestinal obstruction

Cardiogenic shock is a rare cause of circulatory failure, it is seen most often in cases where a patient is struck by the steering wheel of a car when he is forcibly thrown forward as his car comes to an abrupt halt on striking a solid obstruction The sternum is fractured and the heart is injured directly

In 80 per cent of fatalities due to violent accidents, death is caused by loss of blood and it is therefore of paramount importance to appreciate the urgency of blood replacement The amount of blood lost by a patient is not always fully appreciated when the patient is first seen at the casualty department Blood loss is much more apparent if the patient is first seen at the site of the accident Because of the fact that comparatively little blood is seen when the patient arrives at the hospital, a false estimate is made of the patient's condition A good practical working rule to assess blood loss may be termed "the hand rule" Although it is rather rough and ready, it works well If a patient's wound can be covered by an adult's open hand, he has probably not lost more than 1 pint of blood, but if it is larger than one hand size he has certainly lost more than 1 pint One pint per hand area is surprisingly accurate If important vessels are cut he may easily lose much more than 1 pint from even a small wound If a lacerated contused wound exists between the knee and the ankle joint it takes not less than three hands to cover it and in these cases the patient is unlikely to have lost less than 3 pints of blood This is extremely serious In all such cases a blood transfusion is necessary In cases where concealed hæmorrhage is suspected, such as in cases of fracture of the pelvis where there is no visible wound area which can be measured, the "tilt" test should be applied (See Extract, Chapter 7) Elevation of the patient from the horizontal position to 75 degrees gives rise to an acceleration of twenty beats if there is a concealed or visible hæmorrhage of 1 pint of blood If a litre of blood has been lost there is usually a rise of up to forty beats per minute This is a very valuable and rapid method of estimating the volume of blood lost If the pulse-rate of the patient is taken while lying in the horizontal alone little difference from the normal will be noted unless there is a loss of blood of over 1 litre Sphygmomanometry alone is of very limited value Certain parts of the body give rise to a very rapid blood loss, and such is the case with wounds of the face, the scalp and the tongue The volume of blood lost from limb hæmorrhages is very variable, depending on the site of the injury and the vessels implicated It is most desirable to raise the blood pressure to normal by blood replacement before general anæsthesia is used

Stimulants are of very limited value in raising the blood-pressure and are secondary to replacement of whole blood to make up the depletion Where the blood loss is known to be quite small and the blood-pressure is low noradrenaline can be given in a dose of 0 05 gm and is a useful stimulant

Blood volume can be increased by the use of

1 Intravenous saline glucose, this is not very effective, being excreted quickly

If there is blood in the specimen it can be concluded that some part of the urinary tract has been injured, most likely the bladder   The bladder will contain blood stained urine if the injury is in the extraperitoneal position   If the dome of the bladder is perforated urine will leak into the peritoneal cavity, and in these cases only a few drops of blood-stained urine can be withdrawn   To know whether the bladder is or is not injured before undertaking a laparotomy is helpful   A bladder perforation due to a circular pellet is very small and can easily be overlooked if great care is not exercised to detect it

A perforating wound of the abdomen with gut damage when operated upon gives results very like those noted in cases of perforated peptic ulcer, gastric or duodenal   If operated upon within the first eight hours the results are good   If operated upon within the second eight hours the results are *fair, and if not operated* upon until the third eight hours the results are very bad   Those operated upon after twenty-four hours seldom recover, even though they do not die for several days   Internal hæmorrhage and infection are the two main causes of fatality   If there *are several perforating wounds in adjacent loops of the intestine, it is much wiser* to undertake a wedge-shaped gut resection than attempt to close multiple closely approximated and lacerated bowel wounds   The number of gut perforations is usually a multiple of two, being either two, four, six or eight, etc, rather than one, three, five or seven—uneven numbers   If an uneven number of perforations is noted, great care must be exercised lest one has been overlooked   In suturing

The wound should be closed with two layers of sutures, the first continuous, the second interrupted   Catgut No 0 is suitable for this purpose   Atraumatic suture material is advisable if available   Thread used on a non-cutting needle is quite suitable if atraumatic needles with catgut inserted are not available   In all cases of intestinal perforation the patient is benefited by a blood transfusion   There is a lowering of the blood-pressure not only due to loss of blood, but also by the absorption of a histamine-like product associated with the gut damage and this lowers the blood-pressure in a manner comparable with histamine shock

In cases of gunshot wounds of the limbs, it is usual to find many pellets in the tissues   These are often very difficult to find at operation even though they *appear easy to locate on the X-ray films*   Patients like the pellets removed and if they are not removed they attribute all manner of ills to them   In a high proportion of cases pellets in the limbs are much better left alone, the infection associated with their entry can usually be controlled easily with penicillin   Spherical gunshot pellets *seldom* cause late abscess formation   they seldom if ever erode local blood-vessels   Much damage can be caused and needless scarring produced by injudicious attempts to remove them   Having failed to remove pellets on several occasions, the diffici   The practice was
adopted in later year
About 50 per cent

there is a very high risk of bowel perforation and damage to the urinary bladder, and in view of these hazards early operation is most desirable Operation at three hours after admission is suitable, this allows time for blood transfusion, X-ray and preparation of the operation area The timing of the operation is, however, dependent on the patient's fitness to stand a general anæsthetic Radiography of these patients is best undertaken with the patient in the sitting position, as this encourages any air escaping through a gut perforation to enter the subphrenic space The demonstration of a pneumoperitoneum is a pre-operative method of detecting with certainty the presence of gut perforation The appearance of a pneumoperitoneum (Fig 69) due to gut perforation is very characteristic Metal pellets are easily visible in abdominal radiographs Localised peritonitis develops rapidly in all perforation cases and general peritonitis in many A state of paralytic ileus with abdominal distension soon develops In view of the serious risks associated with abdominal perforating wounds *all such cases should have a laparotomy performed* Even in the rare cases where gut perforation has not occurred, internal hæmorrhage needs to be arrested and this is in itself a further indication for laparotomy

In nine out of every ten patients the gut is perforated and if conservative measures are attempted in treatment the mortality is extremely high There is a temptation to treat perforating abdominal wounds conservatively if they are not seen on the day they occur, thinking that if the general condition is " not too bad " after forty eight hours the patient will probably improve This attitude is incorrect the case should be operated upon Having personally in earlier years avoided operation in some of these cases, it was found that they all died with extensive peritonitis between the seventh and the tenth day after the receipt of the injury In later years operation in all cases has been adopted with conspicuously better results A few cases not operated upon have recovered where the bullet entered the liver without damage to the intestinal tract, but such an injury is exceptional Removal of the pellet itself is not nearly so important as closing the perforations which it has caused Perforating wounds of any part of the intestinal tract are highly dangerous Where there is a perforating wound of the anterior aspect of the stomach great care must be exercised that a second perforation is not overlooked in the posterior aspect of the viscus A systematic search must be made through a wide opening in the lesser sac of peritoneum The opening should be made along the whole length of the greater curvature of the stomach so that the organ can be fully rotated on its long axis, making the posterior aspect visible

In operating on bullet wounds of the abdomen the incision should be made in the middle line and not by an opening made by extending the original bullet wound It is much better to use a midline incision as this allows adequate access for the essential inspection of all parts of the abdomen This new clean wound is less liable to be followed by post-operative herniation than if the infected original wound is simply extended The track of the original wound should be excised and the edges drawn together loosely

If an opaque pellet is noted in the area of the lower abdomen, there is a likelihood of the bladder being injured In these cases a rubber urethral catheter should be passed per urethram to see if clear urine can be withdrawn or otherwise

attempting to extract foreign bodies from between the tendons on the volar aspect of the wrist joint It is considered wise to transfer these cases to a station where X-ray facilities are available for localisation of the foreign body, because of the danger of infecting the tendon sheaths about the wrist joint in a prolonged effort to find the object If infection occurs great disability may result due to adhesion of the flexor tendons

In some cases where there are extensive lacerated wounds and multiple fractures, it is necessary to decide whether an immediate amputation should be undertaken or if conservative measures are indicated There is a natural reluctance to lose any part of a limb and most patients are willing to accept prolonged invalidism rather than lose any part of a limb Where serious wounds have occurred, it is advisable to examine the movements of the joints so that a fair estimate can be made of the extent of damage to tendons This must be done before the patient is anæsthetised When the wounds are properly washed the extent of the injury is often found to be less than appeared to be the case at first In view of the ability of the hand to recover and adjust itself following injury, every effort should be made to conserve as many digits as absolutely possible If the patient is considered likely to have a final disability of more than 75 per cent in the injured part, it is better to amputate the damaged part, removing the structures distal to the injury All adjacent parts less seriously involved should be conserved In many cases of hand injury which initially look very serious the major damage is ultimately found to implicate one finger and its corresponding metacarpal bone only, while the injuries to the other fingers are of a comparatively minor nature

In the "burst gun" hand injury so commonly seen in indigenous hunters in the tropics, the result of surgical treatment is, in most cases, surprisingly good Almost invariably the left hand is injured as this hand, in a right handed person, holds the base of the barrel where it is attached to the foremost part of the stock of the gun It is in this position that the gun bursts A well made shotgun is tested during manufacture to withstand a load which greatly exceeds that produced by the standard cartridges made for the gun so such accidents seldom occur Where guns of poor manufacture are used this accident is comparatively common The volume of powder used in a muzzle-loading gun is seldom accurately measured and this predisposes to the accident Although extensive laceration of the hand tissues is noted, there is seldom much loss of tissue The damage is more extensive on the palmar than the dorsal surface It is also usual to find that many of the flexor tendons are lacerated but few are cut across completely, they are therefore capable of considerable recovery Very frequently two metacarpal bones are fractured and a proximal phalanx of one finger It is seldom necessary to remove much tissue, small portions of muscle from the thenar and hypothenar areas may require excision Much better results are obtained if the remains of tendon sheaths are drawn back over the exposed tendons for by so doing adhesions are reduced and ultimate function is improved Suturing of tendon sheaths is tedious and requires much patience but the results are much better if this is done The minimum number of sutures should be used to bring tissues back to their original positions Adequate drainage is afforded by loose suturing Vaseline gauze is used on the wounds and then light dressings The hand should be placed in the

25 per cent seldom do any harm Pellets tend in time to work towards the surface It is permissible to be conservative in treatment of pellet wounds of the limbs A tourniquet and general anæsthesia should be used where an attempt is made to locate and remove a foreign body in the tissues whether palpable or not With a dry operating field pellets are much more easily detected It is disappointing both to the patient and the doctor if after a prolonged search a foreign body cannot be found A scar remains without any useful purpose having been achieved

In country stations where there is no X ray apparatus available a good method of locating deep seated foreign bodies which cannot be felt is to use the technique of "needle palpation" A sharp cutting needle is inserted through the skin over

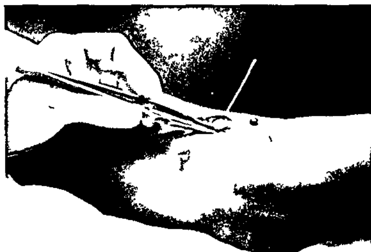


Fig 201
Needle palpation for deep seated foreign bodies in the tissues

the area where it is estimated that the foreign body is likely to be lodged The tissues can be systematically probed through one needle puncture in the skin In a high proportion of the cases the metal foreign body can be felt If this is the case the needle can be left *in situ* and a small opening made along the shaft of the needle thus reaching the object by the shortest route Fig 201 shows a deep-seated pellet located by this method which could not be felt through the skin using the finger If the foreign body cannot be felt by this method little if any damage is caused and no mark is left If X-ray facilities are available, it is advised that foreign bodies should be located under the fluorescent screen and a needle put into the tissues down to the foreign body with the patient under an anæsthetic The patient is then returned to the theatre, with the needle still in position, and the area opened along the needle track This method is less likely to cause damage to important structures than if an incision is made in a dark room through all intervening structures when approaching the foreign body The method also necessitates a shorter X ray exposure which is an advantage Great caution is necessary in

exposed and the fragments gripped in bone forceps The broken ends are partially dislocated towards the surface so that a strong Kirschner wire can be introduced



FIG 202
Wire overlay method of estimation of alignment of lower limb fractures

into the medullary cavity of the longer fragment of bone involved The wire is then cut off about 1 cm beyond the level of the fracture By manipulating the fracture while traction is applied to the distal fragment the short exposed wire is

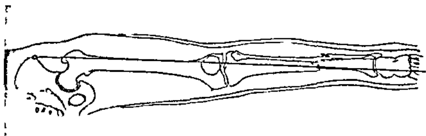


FIG 203
Tracing of serial X ray photographs of left leg showing superimposed wire as on films Same case as in Fig 202 (see text)

threaded into the medullary cavity of the shorter fragment Using an artery forceps the wire is then gripped and levered into the shorter fragment so that ultimately the wire holds the two fragments in good alignment The soft tissues are closed with catgut and a well padded plaster of Paris is applied X-ray

optimum position of function following operation, that is, as though gripping a tumbler This position can conveniently be maintained by bandaging the hand round a cigarette tin Light bandages are applied followed by a very light plaster-of Paris cover The hand is placed half-way between flexion and extension of the wrist The plaster prevents movement at the wrist joint The dressings need not be disturbed for two and a half weeks which is the optimum time unless there is a rise of temperature After this time gentle movements are encouraged A splint is subsequently used at night to prevent injury of the healing tissues Ultimate disability is usually not more than 20 per cent in these cases Improvement continues for up to one year with physiotherapy and exercises at home

Disability is likely to be high in limb injuries if large nerves are cut or if joints are opened and associated with fracture entering these joints Adequate splintage should be ensured following surgery, for complete rest is a major factor at the stage of early recovery Graduated controlled movements are usually desirable after union of the primary structures has taken place

Treatment of fractures in the tropics differs little from that in any other part of the world and standard works on orthopædics deal adequately with the subject Only a few points are therefore mentioned here which have a particular bearing on work as it is found in rural areas in the tropics Fractures of the lower limb occupy hospital beds more frequently and for a longer time than do fractures of the upper limb Non-union in fractures in indigenous patients in the tropics is *extremely rare and is less common than in European patients temporarily resident* in tropical areas, who appear much more liable to non-union of fractures than when they are resident in temperate climates Weight extension with various forms of adhesive plaster is not satisfactory in warm climates if the weight applied exceeds 12 lbs Strapping extensions are therefore of little value in the treatment of lower limb fractures except in children Pin traction and the use of plaster of Paris are the two most satisfactory methods of retaining fractures in position while they are healing

If X-ray facilities are not available for examination of fracture cases, it has been found a useful method of controlling the line of the lower limb, when being put in plaster of Paris, to use a piece of wire stretched from the position of the anterior superior iliac spine to the first interdigital cleft between the big toe and the second toe of the foot with the big toe pointing directly upwards When the limb is in the correct line from above downwards, the wire should pass over the highest point of the patella The highest point corresponds to its outer third If this line is confirmed by X-ray examination, it is seen that such a line gives a good anatomical position of the fragments of the bones of the lower leg Fig 202 shows the method being demonstrated on a patient in plaster in an X-ray department Fig 203 shows a tracing of the corresponding serial X ray photographs On the lateral aspect the line of the wire should correspond to the three points which are the anterior superior iliac spine, the prominence of the lateral malleolus of the ankle joint and the head of the fibula

Where there is difficulty in maintaining the correct alignment of the fragments in cases of fracture of the bones of the forearm, humerus or the tibia, the method of Lambrinudi's endomedullary wire fixation is excellent The fracture must be

The Monteggia type of fracture, in which there is a dislocation of the head of the radius and a fracture of the upper half of the ulna, has been personally encountered very frequently in West Africa although this is not the experience of some others. Most of these fractures are compound in type. They occur as a result of the forearm being struck while the patient is holding on to the upright support of the roof of a lorry, the hand gripping the support at the level of the face and with the elbow flexed. Considering the results of conservative and operative treatment of this type of fracture, there is no doubt at all that much better results are obtained if the head of the radius is removed as a routine procedure in these cases. If the head of the bone is not removed flexion is interfered with and it is very difficult to replace it accurately. After the head of the radius is



FIG. 205
Method of holding arm with bandage during application of plaster of Paris

removed the arm can be put in a padded plaster-of-Paris cast in flexion to a right-angle position. On removing the plaster four weeks later gentle movements can be started. If the head of the radius is not removed flexion is obstructed and there is marked incapacity for a prolonged time and a full range of movement is seldom obtained. Following operative measures good flexion and extension are attained within three months. This is particularly the case where facilities for adequate physiotherapy are very limited, or where patients living a long distance from the hospital are unable to attend regularly for treatment.

Dislocations of the hip are also very common following lorry accidents. The injury is caused by the knee being struck while the patient is sitting on the seat of an abruptly halted lorry. The dislocation is, in a high proportion of cases, of the posterior type. It is necessary to become familiar with the standard methods of reduction of these injuries. With posterior dislocations the hip and knee should be well flexed. The adduction and internal rotation deformities should be initially increased. Traction is then put on the lower leg with the anæsthetised patient on the floor. While counter-pressure is applied to the pelvis by an assistant, the

examination confirms the alignment (Fig 204) The wire is left in the medullary cavity permanently Large doses of penicillin should be given to the patient following operation to decrease the risk of seps s The method has been used personally in simple and compound fractures

the crest of the tibia where it is inserted The pin is inserted with a hammer, which is simple and efficient No drills, wire guides, stirrup distractors or wire cutters are required Three-foot lengths of braided wire or thick monofilament nylon are much more suitable for weight extensions than any form of cord as they



FIG 204
X ray photograph of broken humerus showing endomedullary wiring method of fixation

do not break They can be purchased in most of the large towns in the tropics Only when plaster of Paris is not available is its value fully appreciated There is great difficulty in substituting it by any other material which is equally efficient as retentive apparatus

In treating fractures of the bones of the forearm where little assistance is available, it is considered that better results can be obtained if the plaster is applied from the middle of the upper arm to the hand with the elbow in the extended position, that is, with the arm straight This position can easily be maintained by the assistant pulling on a bandage tied round the third and fourth fingers and held several inches beyond the tips of the fingers (Fig 205) In this way the nurse does not get in the way of the doctor applying the plaster A firm steady grip is easily maintained, the line of the pull is optimal and slipping is less likely than when an attempt is made to grip the fingers The straight arm position is quite comfortable for the patient Arm and leg plasters should be split after they have been applied, thus preventing the risk of undue constriction due to temporary circulatory disturbance

Cane describes an artificial limb of the "peg leg" type suitable for below-knee amputations The patient kneels on a bucket-like support There is a short medial and a longer lateral thigh board attached to the bucket which give support and afford a means of fixing the limb in position by straps This leg is serviceable and inexpensive—costing approximately thirteen shillings Fendall has suggested a light metal bucket welded to a piece of metal tubing The knee action is retained by a jointed metal strut on each side The leg is maintained in position by a leather corset into which the metal struts are fitted The corset is firmly laced in front The total weight of this fitting was only 3 lb 10 oz and it cost thirty shillings

Burkitt suggested a simple and quite efficient artificial limb for above-knee amputations using a glue product "Laitzoo XXX" and bandages to prepare a stump bucket and a resinated asbestos product "Durestos" to make the shell of the leg from thigh to ground level Initially a plaster case of the stump is made A brush handle or pole is fitted into this for convenience of holding it during subsequent operations Round this stump case a wide piece of chamois leather is stitched which can subsequently be turned over the top edge and fixed to the stump socket for the comfort of the patient The glue and bandages are wrapped round the stump cast and on hardening form a strong "glue cloth socket" The Durestos is sold in sheets of 50 by 75 in and two pieces are cut wide above and narrower below With the socket in position the length is measured so that the lower end of the Durestos reaches to the level of the ground The shape of the Durestos can be accurately estimated by cloth patterns made by adjusting cloth on the other leg, allowance is made for the socket above The virtue of this Durestos material is that it is possible to soften it by heating in a steam bath so permitting of it being fashioned into approximately the shape of a normal limb It can be accommodated to the sides of the socket above and fixed to a wooden bung below For the softening a large galvanised bin was used with a few inches of water in it, which was boiled by a stove placed beneath the bin The softened Durestos was then adjusted to the necessary shape to simulate the other leg and fixed in position above by a cylinder of rubber tubing from a motor-car tyre and below to a wooden bung on which the patient walked The limb so made was finally hardened by drying in a dry oven at 90° C A well-heated electric shock cradle could be used for this purpose, the ends being well covered up The chamois leather was rolled over the top of the stump and fixed in position This artificial limb does not permit of knee movement Considering the low cost of this limb (thirty shillings) it is to be commended (see Extract)

FURTHER EMERGENCY CASES

Many patients are brought to hospital complaining of "something stuck" in the ears, nose or throat In some instances the object has entered the larynx, trachea or the œsophagus It is necessary to have suitable instruments available for the removal of these foreign bodies Frequently objects can be removed from the external auditory canal by syringing with warm alkaline solutions It is an advantage in these cases to draw the pinna slightly laterally in order to straighten the passage and so facilitate the removal of the object If syringing is not successful

…e anti-clockwise circular direction from the th…
the nine o'clock position and as the knee reaches the outer p…
circle the leg is straightened It is seldom difficult to reduce this fra…
maintain it in position unless there is an associated fracture of the post…
of the acetabulum If there is a fracture present the dislocation recurs f…
reduction, and traction and weight extension are necessary in treatment…
anterior dislocations of the hip joint the reverse type of action is required…
reduction Abduction and external rotation of the thigh is the charact…
deformity of anterior dislocations For replacement these deformities are incr…
and clockwise rotation is then instituted with downward pressure on the…
position instead of traction, as the knee is being rotated Dislocations and fract…

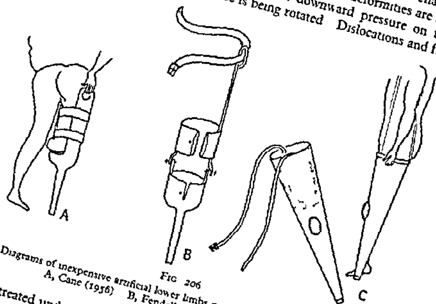


Fig 206
Diagrams of inexpensive artificial lower limbs prepared locally at our stations
A, Cane (1956) B, Fendall (1952) C Burkitt (1953)

are better treated under general anæsthesia than pentothal anæsthesia which is not always adequate for the purpose

Loss of any part of a limb following an accident is a serious disability The …se of artificial limbs is but a poor substitute for the part lost In cases of serious …jury of the forefoot a Syme's amputation is very suitable in many cases and is …be preferred to a below-knee amputation through the tibia because of the difficulty …supplying and maintaining artificial limbs in the tropics Without individual …tion in fitting artificial limbs it is very difficult to obtain a satisfactory prosthesis …te of careful measurements being taken It is necessary to have at least one …al limb fitting centre in each of the capital towns, so that patients can receive …dual attention

…the absence of professional skilled help in the preparation of artificial …everal procedures may be adopted (Fig 206) Methods have been suggested …,[2] Fendall[3] and Burkitt[4] details are given with each of their articles

should not be deferred till the next morning as fatal obstruction is a serious risk In a case noted post mortem, where the gravity of the situation was not appreciated by a junior colleague, a piece of meat was found obstructing the larynx, this could have been removed *without difficulty* The larynx became suddenly and completely obstructed soon after a dose of morphia had been administered

If in exceptional cases in remote stations a foreign body cannot be removed from the œsophagus because there are no endoscopic instruments available, a direct operative approach to the œsophagus is sometimes advisable For this purpose a 2½-in incision is made along the lower part of the anterior border of the sternomastoid muscle The deep tissues are separated till the œsophagus is reached This structure can be recognised more easily if a rubber catheter is passed down the œsophagus after the patient is anæsthetised Caution is necessary to guard against injury to the recurrent laryngeal nerve On opening the œsophagus the edges are held apart with light tissue forceps of the Allis type The foreign body is removed with a long forceps passed into the opening and down the lumen A closure is made in layers and a catheter should be left in the œsophagus and stomach so that the patient can be fed with milk without the œsophagus being soiled Antibiotic drugs are used to control infection

Fractures of the jaw are very commonly seen following lorry accidents Their management requires ingenuity and skill Complicated supportive apparatus of the Stader splint type has been devised whereby external fixation is maintained by multiple pins screwed into the bone fragments After adjustment of the bone the pins are held by bridge-like attachments fixed by coupling joints This apparatus is expensive and difficult to use without considerable practice The fixation of broken jaw fragments by wire placed between the teeth round the area of the fracture is again difficult to manage If the stability of the wire fixation is increased by wiring the upper and the lower jaws together the patient sustains considerable hardship in not being able to take solid food for several weeks Patients in the tropics who eat a large bulk of food with a relatively low calorific value find such treatment very irksome A method personally used with satisfaction which is very simple and quite efficient is to tie the fragments together with strong black thread Two loops of double thread are passed down between the teeth at two positions on each of the broken parts (Fig 207) Thread seldom fails to enter the spaces between the teeth A length of Kirschner wire is then cut and bent so that it can be placed round the bases of the teeth on their outer aspect The fragments of the jaw are then manipulated and held in position by an assistant The double thread loops are then brought over the wire and again inserted between the teeth, fixing the wire in position The threads are finally passed across the back of the teeth and out again between the teeth, but at a different position from that first used With the ends now on the outer aspect of the teeth and remaining long, they can be tied using a surgeon's knot of the double loop type so that they do not slip while the second tie is being inserted This method is much more comfortable than when wire is used, as there are no wire ends protruding in the mouth If the patient is given a strong sedative a general anæsthetic is seldom required A fractured jaw bandage is then used in addition, but it can be removed twice a day to allow the patient to take soft food and clean

it is necessary to use an instrument to dislodge the impacted mass For this purpose a Gardiner Brown aural curette and hook is considered the most suitable With this curved-loop type of vectis minimal trauma is inflicted and removal is seldom followed by bleeding This instrument is also useful for extraction of foreign bodies from the nasal cavities of patients, usually children, who put them there Beads, small stones and ground nuts are the most usual objects found

Electric endoscopes, as designed by Macintosh, Rae & Magill, for visualising the larynx when passing endotracheal tubes, are most useful instruments for examining all parts of the hypopharynx Illumination is supplied by a small bulb inserted in the blade and electric batteries are housed in the handle A battery handle suitable for carrying a size U2 Ever-Ready battery is made by Messrs Longworth Ltd, Abingdon, England, new batteries can be purchased from small shops in many villages in the tropical world, as they are used for standard hand torches An 8 in or 10 in crocodile forceps is used to grip the foreign body and remove it Fish bones are very frequently stuck in the throat inadvertently when a person swallows a mass of food, the accident occurs most often in communities where the main diet is fish and rice The bone is found most often in the tissues at the base of the tonsil It is advisable in most cases to use a general anæsthetic before attempting instrumental extraction of a foreign body from the nose or throat Great care must be exercised in cases where the object is impacted close to the larynx lest sudden obstruction of the airway occurs

Before bronchoscopes and œsophagoscopes were easily available the use of a coin catcher was often employed in conjunction with fluoroscopic X-ray screening for removal of coins lodged in the œsophagus The method was very satisfactory and has personally been used many times when an œsophagoscope was not available It should not be employed without X ray control for visualisation The old-fashioned probang instrument, often attached to the opposite end of a coin catcher, is not considered a safe piece of apparatus to use An emergency bronchoscope is an excellent instrument It can be used for examination of the trachea and entrances to the major bronchi, or the œsophagus Its great virtue is that it carries batteries in the handle and is quickly available It can be used in country stations where no electricity supply is in use For those with limited training in bronchoscopic methods it will be found helpful before passing an œsophagoscope or bronchoscope to estimate the distance of the opaque object from the upper teeth with the head of the patient in the extended position The exact site of the object is noted on the X-ray films relative to easily recognisable anatomical points The distance is measured off on the tube of the instrument and several circles of thread are tied round the instrument at that position By so doing a rough estimate is given of when the foreign body should come into the visual field and the risk of passing the foreign body or pushing it into the wall of the œsophagus is reduced

In cases where there is an attack of laryngeal stridor in the absence of acute bronchitis or a history of an object being inspired the presence of an ascaris worm in the larynx should be suspected The bulk of the worm and the irritation of its movement are sufficient to cause a spasm of the larynx and interference with respiration Removal of foreign bodies, swallowed or inspired, should be undertaken as emergency procedures If patients are admitted at night treatment

This instrument was originally designed for the protection of the facial nerve during radical mastoid operations

The frequency of admission of cases of fracture of the spine with paraplegia is a matter of concern in hospitals in the tropics where this form of accident is often seen In these cases neurogenic trophic bed sores develop rapidly There is great difficulty in giving adequate nursing care The neurovascular disturbance below the fracture level is most marked during the first ten days after the accident After this time it becomes somewhat adjusted and danger of bed sores decreases To circumvent the difficulty of acute bed sores in these cases thick traction hooks have been used (Fig 208) These were made for me by Messrs Allen & Hanburys, London They are inserted under strict aseptic precaution through the crest of



Fig 208
Pelvic hook suspension to prevent bed sores in fractured spine case

the ilium on each side, close to the anterior superior iliac spine The initial perforation for the introduction of the hooks is made by hammering a straight Steinmann's pin through the bone on each side These are removed and the hooks threaded through the openings so formed Sterile dressings must be fixed over the position of the hook perforations The hooks do not penetrate the peritoneal cavity The body is suspended from an overhead beam or Morrison's frame, using a strong braided wire which is attached to the two hooks The buttocks are raised 1 in from the surface of the mattress By this means early bed sores are completely avoided Suspension of the body in this way causes slight hyperextension of the lumbar spine which is desirable in these cases The hooks should not be used for more than fourteen days as they are liable to cut through the bone if used for a prolonged time, they are, therefore, considered only a temporary adjuvant in treatment The danger of bed sores is much reduced after the second week The hooks are useful where specialised facilities are not available for treatment of fractured spine cases The skin wounds heal quickly after the removal of the hooks If infection occurs it should be controlled by the use of penicillin

the mouth Jaw fractures adhere together by granulation tissue within a week and become consolidated within three weeks The thread can be removed later by clipping it with pointed scissors Black thread is better than white as it is seen more easily If the fragments become a little loose after one week an additional piece of thread can be applied in a position above the wire splint

Small children are often brought to hospital with pond fractures of the skull They occur in most instances when children fall off the mother's back where they are tied as the customary method of carrying them These fractures seldom cause immediate serious disability, but may do so at a subsequent date The

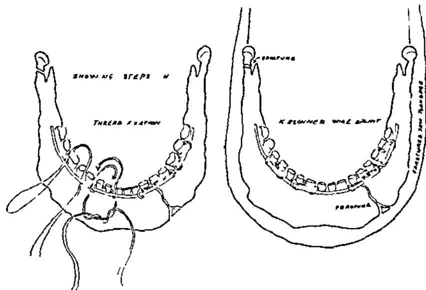


FIG 207
Diagram of splintage and thread fixation of fractured jaw

danger of epileptiform manifestations later must be considered It is therefore thought advisable to elevate all fractures of this type as the operation is simple and if not undertaken the potential danger and the persistent depression is a constant source of worry to the mother It is easier to elevate the fracture soon after it occurs than many months later A baby's skull is very thin and is easily trephined with a small instrument If no trephine is available a minute borehole can be made with a blunt-pointed scalpel by rotating it in the base of the depression After the borehole is made a small piece of bone is cut out with well-controlled hand movement, always in the outward direction, the point of the scalpel being put into the perforation and with the blade of the scalpel pointing away from the head, the point is slowly elevated A section of bone, 3 mm square, is removed Into the central opening an angled instrument is inserted between the dura mater and the bone and elevated gently A Stakie's guide is suitable for this purpose being a strong curved instrument with an angled projection on it

hunderstorm when a bright flash of lightning occurred The electric light was ot damaged but the teacher sitting beneath it was killed There was some iscoloration noted about the eyes and on the left cheek The back of the body vas somewhat darker than the front No other changes were noted On the body of the African boy who was killed there were no marks at all, the hair was singed The other African boy struck but not killed, was sitting near a wireless set which "spouted flame" There were dark lines stretching from the right axilla to the right foot with zigzag offshoots from it Some water blisters were noted on the inner side of the right upper arm and a darkened patch discolouring the skin of the subumbilical area

Also in 1957 ten boys were struck by lightning while sitting in a group at the Boys' School at Mwanza, Lake Province, Tanganyika Six were killed and four injured Fig 210 shows a personal photograph of two boys who were struck by lightning in West Africa Five boys were sitting in a circle telling stories when lightning struck the ground where they were sitting Two were killed immediately, two were brought to hospital and one boy ran away, apparently unhurt The boys brought to hospital were found to have irregular second-degree burns on various parts of the body They also had very peculiar abrasions on the legs as though struck by multiple small stone splinters Their clothing did not catch fire but was singed as was also their hair The distribution of the burns was quite irregular One boy showed a rectangular burn area on the inner aspect of the left thigh which looked by the impression to be due to a rectangular cigarette tin in a trouser pocket at the time he was struck, but this he denied On arriva



FIG 210
Lightning injuries, burns and abrasions by stone splinters

at hospital two hours after the injury, the general condition was good and the were admitted for a few days' observation and treatment of the burnt area Fig 211 shows another case of a woman struck by lightning or a thunderbolt Sh sustained an extensive injury of the right forearm with loss of quite a large ar of skin and muscle tissue There was a linear wound from the upper lip to t angle of the jaw on the left side There was also (Fig 212) an irregular lacerat wound on the dorsum of the middle finger of the left hand The patient treated for severe shock and multiple wounds Patients struck by lightn frequently die immediately with burns of varying degrees, or no visible inj Following non-fatal lightning injuries cardiac irregularity is very usual for s hours after the injury There is usually extensive exudation of serum into tissues adjacent to the site of the burns and this is associated, as in cases of b of other types, with marked secondary shock from lowering of the blood pl

Fracture of the cervical spine occurs most commonly in patients carrying head loads. When a single load, such as a heavy plank, is carried between the heads of two persons and the front carrier falls, the back carrier frequently sustains a fracture-dislocation of the cervical spine. Without reduction of the dislocation these patients invariably die. If the displacement is reduced about 50 per cent of the patients live. Reduction of these fracture-dislocations is achieved by strong steadily applied force from beneath the chin and in the upward direction. This manipulation is undertaken on the X-ray table with the patient under a general anæsthetic. Photographs are taken before and after the attempted reduction. The easiest method of applying the necessary force is by placing the loop of a roller

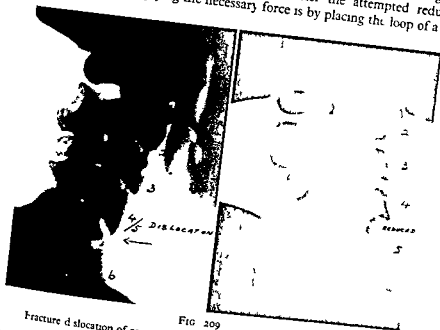


FIG. 209

Fracture d slocation of cervical spine due to a fall wh l arry g h ad l ad

...el beneath the patient's chin and getting the other end of the towel round the ...rator's waist. The patient is held in position by assistants and the head steadied ...h the face pointing upwards while the doctor undertakes the manipulation ...leaning backwards and if necessary increasing the force by pressing a foot on ...base of the table, the dislocation is reduced. Fig. 209 shows X-ray photographs ...e cervical spine of a patient for whom this was done. There was a detectable ... when the reduction occurred. The patient was then treated in a suitable ...support. The X-ray shown is a positive print of a negative film.

...ightning injuries are more commonly encountered in the tropics than in ...rate parts of the world. Certain areas of ground are very frequently struck ...htning. The types of injury sustained are very diverse in nature. At ...ick's Boys' School, Mzidi Limbe, Nyasaland, as reported by Justin,[4] 1958, ...ersons were struck by lightning in a bungalow—one European teacher ...o African boys. The former was sitting beneath an electric light during

antidote Sunlight destroys the poison and for this reason the arrows containing it are kept in darkness so that they retain their potency till they are about to be shot To test the efficiency of the poison the hunters make a small cut in their own arm and allow blood to run down from it so that they can note the effect on the lowest part of the line of blood If blackening of the blood occurs which actually ascends in the line of the blood, they conclude that the juice from the tree contains the active poison The fruit of acokanther trees is edible and not poisonous This type of tree is dying out because of the demand for the poison by local hunters *Ouabain* was first noted by French workers in Abyssinia It has been known for many years An analysis of this substance was made by Professor



FIG 213

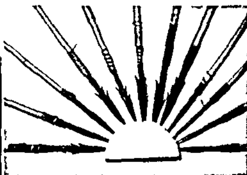


FIG 214

Fig 213—Arrow wound of left thigh Shaft of arrow was removed by the patient himself

Fig 214—Selection of arrow heads Those with no barbs contain arrow poison

Werner in Dublin University in 1928, as reported by Maguire [8] The following observations on fatalities by this arrow poison are noted

1 Monkeys shot by these arrows die in about thirty seconds, struggling but without noise
2 Paralysis of the larynx thought to account for this, action like curare
3 One forest guard shot by arrow died in thirty seconds, blackened area around wound
4 Post mortem shows hæmolysis and blackening of the blood within the vessels
5 Elephant shot by poison arrow travelled only 500 yd and died
6 Blood of elephant liquid and black, swelling and blisters developed about head and chest

There are many arrow poisons known to hunters in the tropics

volume If following lightning injuries marked shock is apparent a blood transfusion should be given in addition to sedatives

Arrow wounds are still seen in those parts of the world where bows and arrows are used for hunting, self-defence or combat Accidental arrow wounds are usually about the limbs (Fig 213) though they may be in any part of the body, but arrow wounds shot with intent to kill are usually about the chest Many of the arrows used for hunting have spikes on them as seen in Fig 214 Where poison is used on the arrows, the arrow heads are usually not barbed along the edges as seen in numbers 2, 3, 9, 10, 11 and 12, from left to right, as without barbs the arrow head penetrates more deeply, thus facilitating the rapid action of the poison. The poison is put on the wrapping between the arrow head and the



FIG 212

Fi [illegible] ghtning wound of right forearm and left side of face Dr H P Schwendler's case
Fig 212—Lightning wound of fingers same case as above

shaft in most cases It should be pointed out that to pull an arrow out of the tissues is quite as lethal as shooting another in, and it is therefore advised that no attempt should be made to remove arrows except in an operating theatre, where the attendant hæmorrhage can be controlled as careful extraction is undertaken Tendall[8] reports an arrow wound of the heart where the patient attempted to pull the arrow out of the chest but failed It was subsequently removed thirty-six hours after the injury was inflicted The patient recovered The Giriama tribe in the northern part of East Africa use poison arrows for hunting Walker gave several interesting details on the subject of Giriama arrow poisoning The poison used is a black gum of a glucoside nature The local name is *ouabain*, it is an extract of the bark and roots of acokanther trees It is closely allied to strophanthus but not identical Only some of the trees of this type produce the poison, not all of them The local hunters recognise the trees containing the poison by noting the presence of dead bats on the ground beneath them The bats are seen to have blackened marks on the skin The poison, which is extremely lethal, produces an acute hæmolysis with blackening of the blood, there is no known

antidote Sunlight destroys the poison and for this reason the arrows containing it are kept in darkness so that they retain their potency till they are about to be shot To test the efficiency of the poison the hunters make a small cut in their own arm and allow blood to run down from it so that they can note the effect on the lowest part of the line of blood If blackening of the blood occurs which actually ascends in the line of the blood, they conclude that the juice from the tree contains the active poison The fruit of acokanther trees is edible and not poisonous This type of tree is dying out because of the demand for the poison by local hunters *Ouabain* was first noted by French workers in Abyssinia It has been known for many years An analysis of this substance was made by Professor



FIG 213

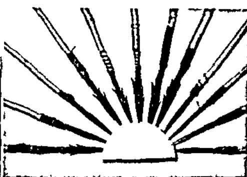


FIG 214

Fig 213—Arrow wound of left thigh Shaft of arrow was removed by the patient himself

Fig 214—Selection of arrow heads Those with no barbs contain arrow poison

Werner in Dublin University in 1928, as reported by Maguire [8] The following observations on fatalities by this arrow poison are noted

1 Monkeys shot by these arrows die in about thirty seconds, struggling but without noise
2 Paralysis of the larynx thought to account for this, action like curare
3 One forest guard shot by arrow died in thirty seconds, blackened area around wound
4 Post mortem shows hæmolysis and blackening of the blood within the vessels
5 Elephant shot by poison arrow travelled only 500 yd and died
6 Blood of elephant liquid and black, swelling and blisters developed about head and chest

There are many arrow poisons known to hunters in the tropics

EXTRACTS

1 From A simple and serviceable artificial limb Burkitt D P (1953) *E Afr med J* 30 177

Materials advised Durestos a resinated asbestos sheet material Grade advised by Burkitt R A 2 (1953) This material is replaced (1959) by Grade R A 9 Sheets are supplied in size 50 in by 75 in by 1/16 in The manufacturers of Durestos are Turner Brothers Asbestos Co Ltd Rochdale England Enquiries to the manufacturers who will inform those requiring the material of the names of agents who stock the product in various parts of the world The malleable character of the material deteriorates if not used within six months of purchase Once it is moulded into any desired shape it remains so permanently

For those with very limited facilities for pressure moulding it will be found easier to work with sheets of Durestos of ... in thickness and use two or three layers This information is given to me by an expert worker in plastic materials whose extensive experience is worthy of consideration

The price of Durestos sheets does not exceed £1 per sheet which permits of the production of an artificial limb at a remarkably low cost

La 1200 XXX glue as recommended by Burkitt can be purchased from Casein (Industries) Ltd Culvert Works Sheepcote Lane Battersea London S W 11 England This material is supplied in containers of 1 lb, or any number of units of 1 lb and in large size drum of 112 lb

The product is a cold water glue and is therefore easy to use It is employed in many industries such as aircraft building ship building furniture manufacture and in manufacture of artificial limbs *Information on its method of use is supplied with consignments sent by the makers* It is supplied retail to all parts of the world by the makers at the above address Its cost is remarkably low

Artificial limb sockets are made by application of the glue and linen bandage to a cast of the stump of the leg to be fitted

2 Sheets of plastic polythene material are now available for making of orthopædic fittings such as spinal jackets unjointed (peg) legs and splints of various sorts

It is much lighter than plaster of Paris and can be washed and cleaned as required Drill holes can be made in it which permits of ventilation and so decreases sweating in warm climates

Polythene malleable plastic sheets are supplied in size 5 ft by 3 ft Thickness most useful is 3/16 in It has the advantage over resinated materials of being less likely to cause skin reactions by contact Approximate price £1 per sheet *ex works*

To mould the material it needs to be heated in a dry hot air oven at 150 C

Polyurethene foam is another plastic sponge material which is useful for padding areas under orthopædic fittings where pressure is exerted Sold in sheets of 39 in by 79 in Cost about £1 per sheet

It is suggested that polythene sheets should be available in all surgical departments in the tropics to replace plaster jackets They cost less and are more comfortable They can be supplied by T K Fisher & Co 4 Wakeman Road, Kensal Green London N W 10, England

REFERENCES

1 YI DIN U (1957) Intra-arterial sodium lactate in traumatic shock *Arkhiv Patologii (U S S R* 8 32
2 CANE A H (1950) Peg leg *E Afr med J* 27 132
3 FENDALL, N R E (1952) Prosthesis *E Afr med J* 29 55
4 BURKITT D P (1953) A simple serviceable artificial limb *E Afr med J* 30 177
5 BROTHER JUSTIN (1958) Deaths by lightning at an African mission station Personal communication
6 FENDALL N R E (1950) Penetrating arrow wound of the heart *E Afr med J* 27 483
7 WALKER D A (1957) Giriama arrow poison *Cent Afr J Med* 3 226
8 MAGUIRE R A J (1928 29) Il Torobo and subsequent Correspondence *J roy Afr Soc* 28 108

22

Diseases of the Motive System

BONE AND JOINT ABNORMALITIES

THE term "motive system" is used as it conveniently embraces a wide range of structures of the body, interference with any of which curtails a patient's ability to carry out normal activity Abnormalities of bones, joints and muscles are of paramount importance, while the integrity of the vascular system and neuromuscular mechanism are essential if chronic invalidism is to be avoided

Certain structural defects such as polydactylism and syndactylism show a strong hereditary predisposition and recur in successive generations An extra digit is seen most often in relation to the fifth finger The extra finger is in some cases well developed, with interphalangeal joints and associated tendons, or it may be very small, simulating a wart on the outer side of the base of the fifth finger In some instances a bifid thumb is seen Supernumerary fingers are best removed by clipping them off with a sharp bone forceps or strong nail clippers The residual wound is closed by two or three fine catgut sutures which come out themselves on the dressing after a week or ten days The incidence of a sixth finger in African infants is between 1 and 2 per cent The condition is seen more commonly in the tropics than in Europe Children are brought early for surgical treatment as the condition is considered a stigma, it is concealed as far as possible until it can be removed

Syndactylism, or union between two adjacent fingers (Fig 215), is most common between the third and fourth fingers There is usually almost sufficient skin present to cover the two fingers individually after the fingers have been divided It is important in planning the incisions to make a tongue-like flap of skin on the dorsum of the affected fingers of sufficient size that it can be rotated and inserted into the interdigital space after separation of the fingers, thus avoiding a scar at that position The flap should reach as high as the wrinkles over the first interphalangeal joint A further incision is made running along the dorsum of the middle finger As the nail is approached it is curved towards the fourth finger A ventral incision in the vertical direction is made along the volar aspect of the fourth finger. At the distal end of the digit the incision is curved towards the third finger On lifting the two flaps so formed the fingers can be separated The flaps raised are wrapped round the sides of the finger to which they are attached and sutured in position Vaseline gauze and dressing are applied and these are left alone for two weeks The hand is placed on a splint The results of operation are good

Congenital dislocation of the hip joint has only been seen on rare occasions in the tropics It is less common than in Europe In the absence of X-ray facilities

EXTRACTS

1 From "A simple and serviceable artificial limb" Burkitt, D P (1953) *E Afr med J* 30, 177

Materials advised Durestos, a resinated asbestos sheet material Grade advised by Burkitt, R.A 2 (1953). This material is replaced (1959) by Grade R A 9 Sheets are supplied in size 50 in by 75 in by $\frac{1}{8}$ in The manufacturers of Durestos are Turner Brothers Asbestos Co Ltd, Rochdale, England Enquiries to the manufacturers, who will inform those requiring the material of the names of agents who stock the product in various parts of the world The malleable character of the material deteriorates if not used within six months of purchase Once it is moulded into any desired shape it remains so permanently

For those with very limited facilities for pressure moulding it will be found easier to work with sheets of Durestos of $\frac{1}{16}$ in thickness and use two or three layers This information is given to me by an expert worker in plastic materials whose extensive experience is worthy of consideration

The price of Durestos sheets does not exceed £1 per sheet, which permits of the production of an artificial limb at a remarkably low cost

Lattzoo XXX glue, as recommended by Burkitt, can be purchased from Casein (Industries) Ltd, Culvert Works, Sheepcote Lane, Battersea, London, S W 11, England This material is supplied in containers of 1 lb, or any number of units of 1 lb, and in large-size drum of 112 lb

The product is a cold water glue and is therefore easy to use It is employed in many industries such as aircraft building, ship-building, furniture manufacture and in manufacture of artificial limbs Information on its method of use is supplied with consignments sent by the makers It is supplied retail to all parts of the world by the makers at the above address Its cost is remarkably low

Artificial limb sockets are made by application of the glue and linen bandage to a cast of the stump of the leg to be fitted

2 Sheets of plastic polythene material are now available for making of orthopædic fittings such as spinal jackets, unjointed (peg) legs, and splints of various sorts

It is much lighter than plaster of Paris and can be washed and cleaned as required Drill holes can be made in it, which permits of ventilation and so decreases sweating in warm climates

Polythene malleable plastic sheets are supplied in size 5 ft by 3 ft Thickness most useful is $\frac{3}{16}$ in It has the advantage over resinated materials of being less likely to cause skin reactions by contact Approximate price, £1 per sheet *ex* works

To mould the material it needs to be heated in a dry hot-air oven at 120° C

Polyurethene foam is another plastic sponge material which is useful for padding areas under orthopædic fittings where pressure is exerted Sold in sheets of 39 in by 79 in Cost about £1 per sheet

It is suggested that polythene sheets should be available in all surgical departments in the tropics to replace plaster jackets They cost less and are more comfortable They can be supplied by T K Fisher & Co, 4 Wakeman Road, Kensal Green, London, N W 10, England

REFERENCES

1 Yi-Din, U (1957) Intra-arterial sodium lactate in traumatic shock *Arkhiv Patologii (U S S R)*, 8, 32
2 Cane, A H (1950) Peg leg *E Afr med J* 27, 132
3 Fendall, N R E (1952) Prosthesis *E Afr med J* 29, 55
4 Burkitt, D P (1953) A simple serviceable artificial limb *E Afr med J* 30, 177
5 Brother Justin (1958) Deaths by lightning at an African mission station Personal communication
6 Fendall, N R E (1950) Penetrating arrow wound of the heart *E Afr med J* 27, 483
7 Walker, D A (1957) Giriama arrow poison *Cent Afr J Med* 3, 226
8 Maguire, R A J (1928-29) Il-Torobo, and subsequent Correspondence *J roy Afr Soc* 28, 108

3 Shortening of the plantar fascia in the sole of the foot
4 Marked rotation of the tarsal navicular bone
5 Contraction of the medial tarsal and ankle-joint ligaments

In about 50 per cent of the cases seen excellent results can be obtained by undertaking a slide tenotomy of the tendo achillis alone and application of plaster of Paris The tendo achillis is split vertically over a distance of 1 in through a small puncture wound, and cut above and below on opposite sides so that as the foot is dorsiflexed the two residual leaves of the cut tendon remain approximated and unite in this elongated position No sutures are required either in the tendon or the skin A dressing is applied and a plaster cast put on from below the knee to the base of the toes The toes should remain exposed so that the circulation of the foot can be observed There is some risk due to stretching of the vessels as they pass round the ankle joint over a somewhat elongated course, due to dorsiflexion of the foot The plaster cast should be split so that temporary post-operative swelling is accommodated To avoid soiling of the plaster of Paris in young infants it is advisable to cover the plaster with a transparent plastic bag, which is tied on loosely below the knee Suitable plastic material is now available in most of the large commercial centres If it is not possible to rectify the position of the foot adequately after tenotomy of the tendo achillis alone, a more extensive operation must be undertaken. Using general anæsthesia an Esmarch's exsanguinating rubber bandage is applied to the leg so that the operation can be undertaken in a clean, dry surgical field A medial "J" incision is made round the back of the medial malleolus of the ankle joint, extending as far forward as the base of the first metatarsal bone The ligamentous aponeurotic layer over the medial vessels and tendons at the ankle joint is incised The neurovascular structures are released The cuboid attachment of the tibialis posterior tendon is then sectioned in order to permit of adequate eversion of the foot The inferior talonavicular ligament needs to be divided to further facilitate eversion of the forefoot A slide tenotomy of the tendo achillis is then undertaken through the medial incision The plantar fascia is next divided close to its attachment to the calcaneus The foot can then be rectified in most instances In some extreme cases it is necessary to cut the capsule of the ankle joint at the back of the talus if there is marked contracture in this position interfering with dorsiflexion In only a small percentage of cases is such an extensive operation necessary Following closure of the wound a split plaster of Paris is applied, it is retained for three weeks After removal of the plaster cast the foot is manipulated several times each day by the mother Club foot splints of the Denis Browne type are useful as they assist the child to manipulate his own feet by the nature of their fixation and swivel action As the foot is rotated outwards it is automatically everted as well When the child starts to walk at the age of 15 months the outer side of the sole of the shoe should be raised to prevent recurrence of inversion It is an advantage to have surgical treatment undertaken for club foot at the hospital in the district where the child lives, as it is easier for the mother to bring the child for continued treatment and observation than if she has to travel a long journey to a main centre Much of the initial advantage gained is lost if treatment

it is difficult to diagnose at an early stage before the infant is walking A useful physical sign for detecting the condition is to place the child flat on a table in the dorsal position The pelvis is held by an assistant so that it cannot tilt to either side, and on flexing the child's knees and hips and abducting the limbs it will be found that on the normal side the leg can be so abducted that the outer side of the thigh rests flat on the table On the abnormal side the flexed abducted thigh will not easily reach the level of the table This limited abduction is strongly suggestive of congenital dislocation of the hip joint If a male or female infant is noticed to have a relatively wide pelvis, approximating closely to the adult female type, it is likely that congenital dislocation of the hip is present Treatment of the condition is most satisfactorily undertaken by the use of a plaster of-Paris



FIG 215
Baby with syndactylism affecting both hands

cast applied with the child in the "frog" position Plaster casts are required for twelve to eighteen months It is an advantage when applying the plaster to insert a loop of bandage over the groins on both sides in order to pull the displaced head of the femur as low as possible The child is held in position on a pelvic rest while the plaster is put on After the plaster hardens the loops of bandage are cut off below as they come through the perineal opening left for nursing purposes

Congenital equinovarus deformity of the feet is a condition seen very frequently in young children Many cases are brought for treatment soon after birth In mild forms of this condition in very young infants treatment by daily manual manipulation and application of retentive adhesive plaster gives satisfactory results if treatment is conscientiously persisted in for up to one year In approximately 80 per cent of the cases operative treatment is necessary The deformity is associated with multiple anatomical defects The individual abnormalities are briefly but well classified by Williams and Kirkaldy-Willis [1]

1 Narrowing of the ankle mortice joint interfering with dorsiflexion
2 Contraction of the tendo achillis and small muscles of the foot

abduction The head of the bone is mushroomed in shape There is limb shortening and slight discomfort during the active stage of the condition The absence of muscle wasting and abscess formation and the excellent general health of the patients all suggest Perthes' disease rather than tuberculosis In most of the cases the condition has been present for six months or a year before treatment is sought Rest and weight extension and sedatives for a limited time are used in some of the cases In some instances it is an advantage to raise the thickness of the heel of the shoe to compensate for the shortening of the affected limb by reason of the coxa vara present

There are many conditions known which give rise to bone rarefaction in the tropics which are not seen in Europe In African children irregularity of bone density is in many instances due to sickle cell disease (Fig 10) In older patients this condition is less likely to be the cause An alteration in bone density also occurs in deficiency diseases, as seen in cases of osteomalacia, rickets and scurvy It may also be due to infective conditions such as tuberculosis, brucellosis, yaws and fungoid conditions of the mycetoma group Giant-cell tumours, sarcoma and malignant secondary growths must also be considered Malignant disease of bone is considered elsewhere Bone softening and rarefaction is in most cases an indication of an increased blood supply in the affected area Bone sclerosis is associated with conditions of endarteritis and ischæmia This occurs in the late stages of syphilitic disease and yaws A gumma has a rarefied centre with a sclerotic periphery In cases of sabre tibia due to yaws there is evidence of bone sclerosis present Pathological fractures are seen most commonly in cases of bone malignancy and chronic osteomyelitis Patients with infective conditions of bone who are found to have sickle cells present in the blood should be given oxygen freely during the administration of general anæsthesia Adequate oxygenation decreases the risk of precipitating a sickle cell crisis during anæsthesia Prior to an adequate appreciation of this danger of sickle cell crises following general anæsthesia there was a relatively high fatality rate following operations for osteomyelitis, most of these on post mortem examination were found to have had sickle cell disease The patients left the theatre in apparently good condition and were looking well when seen the next morning During the afternoon, about twenty eight hours after the operation, they collapsed suddenly for no very obvious reason An Esmarch's rubber bandage should be used as a tourniquet round the affected limb when operating on osteomyelitis cases This conserves blood and facilitates the operation by maintaining a clear operative field, permitting of easier bone clearance and a shorter operating time The bone cavity should be drained at the most dependent part and not necessarily through the middle of the wound. In cases of osteomyelitis of the humerus the risk to the radial nerve is considerable, and in these cases very limited surgery is advised Removal of the sequestrum alone is usually sufficient to arrest the disease As the humerus is not a weight bearing bone the patient is not inconvenienced by prolonged bed rest

Fungoid infections of bone about the region of the ankle joint and tarsus give rise to characteristic appearances in radiographs of the bones involved Sequestrum and sinus formation are common There is gross enlargement of the part due to infection in the soft tissues The prognosis is poor and the function of the infected

is not continued The results of surgical treatment are extremely good in young children in most conditions, and doctors should be encouraged to undertake these operations in district hospitals where possible

There are many causes of bone and joint pains The two conditions must be distinguished from each other Bone pains are usually worse by night than by day and are of a chronic nature Pain can usually be elicited by direct pressure over the bone, but not produced if the muscles alone are pressed Muscle pains are elicited when the muscles are squeezed The presence of pains in the bones and muscles associated with fever and sweating, and followed later by slight jaundice, is very typical in African patients of sickle cell disease Many of these cases closely resemble osteomyelitis of the long bones of the limbs In patients with the sickle cell trait there is a relatively high incidence of bone infection because of vascular obstruction in the capillaries in the peripheral circulatory field In patients of African origin all cases suffering from septic conditions should be investigated for sickle cell disease This is particularly the case in patients with chronic ulceration and bone disease Rheumatism of streptococcal origin is very rare in tropical countries Beet[2] reports the occurrence of rheumatic heart disease in Northern Nigeria and considers that other rheumatic conditions also exist The general opinion held by those in practice in tropical Africa is that rheumatic conditions of streptococcal origin are very rare

Infective arthritis of bacterial origin is not uncommon in infants during the first six months of life In most cases pus removed from infected joints contains staphylococci The condition responds well to surgical treatment with aspiration or drainage and injection of penicillin into the joint as well as by the intramuscular route The pus is removed through a very small incision, but no drainage tube is inserted In spite of bony damage being present the infant usually obtains a good functional result with full range of joint movement The incidence of tuberculous bone and joint disease varies very considerably in different areas of the tropics Bone tuberculosis, other than that situated in the vertebral column, is rare in West Africa, though it is seen occasionally The incidence of bovine tuberculosis in West Africa is considered by the veterinary departments to be very low, in fact negligible Bone tuberculosis is more commonly associated with bovine infections than with the human variety In East Africa the incidence of tuberculous joint disease is much higher than in West Africa The most common form of bone tuberculosis seen in West Africa is tuberculosis of the spinal vertebræ Secondary paraspinal abscess formation resulting from it is frequently seen It is associated with collapse of a vertebral body, kyphosis and sinus formation Patients are reluctant to continue treatment for a sufficient time to ensure permanent results in many cases in spite of the better outlook with the use of streptomycin, para-aminosalicylic acid and isoniazid, in combination with rest, plaster fixation and hospitalisation In a certain number of cases of collapse of the vertebral bodies there is no proof of the condition being due to tuberculosis It is thought that in some of these cases the condition is not of tuberculous origin Remarkably few cases of tuberculous infection of the knee or hip joints have been encountered Perthes' disease or pseudocoxalgia is, however, comparatively common There is limitation of movement of the hip joint, particularly

cast gives good results without causing any external scar It is an advantage in these cases to give a short course of novarsenobenzol intravenously, 0 3 gm twice a week for two weeks If an operation is decided upon, in some cases a



Fig 216 Fig 217

Fig 216—Compound ganglion of dorsum of wrist and forearm
Fig 217—Same case as Fig 216 following four weeks fixation in plaster of Paris

transverse incision across the line of the wrist should be used as it is less likely to be followed by a keloid scar than a vertical incision Compound ganglia about the wrist joint, whether on the dorsal or ventral surface (Fig 216) of the wrist, are usually considered in Europe to be tuberculous, but this is certainly not the



Fig 218
Sole of shoe raised by using football boot studs convenient, inconspicuous and light

case in patients in Africa Where there is a large fluctuant mass of fluid present the patient should be treated in plaster of Paris, immobilising the hand and the forearm A course of *NAB* or *penicillin should be given* This condition invariably settles down quite quickly (Fig 217) No advantage is gained by operation In none of the many cases investigated was any evidence of tuberculosis detected

Patients who suffer from discrepancy in limb length for any reason—hip disease, fractures or osteomyelitis with bone lengthening—do not like wearing a

part can seldom be restored The upper limb and skull are sometimes affected with fungoid diseases Histoplasmosis frequently affects bone, and in cases where tuberculosis is suspected but cannot be proved histoplasmosis should be considered Histoplasmosis sometimes affects the bones of the face and the ribs Other fungoid infections also cause bone rarefaction, such as coccidioidomycosis, which is well known in Central America No cases have been recognised personally in Africa Actinomycosis of bone is rare

Yaws infection of bone gives rise to characteristic appearances in the early and late stages In early cases there is a fusiform subperiosteal thickening of the shaft of the bone This is seen most often about the radius and the ulna If the area is incised in the belief that pus is present, it will be found that there is a mass of sand-like bone granules around the shaft of the bone The periosteum is lifted and much thickened with œdema There is no advantage in removing this early new bone formation The calcified material is rapidly absorbed if the underlying yaws is treated by intravenous novarsenobenzol or penicillin In late cases sabre deformity of the tibia is characteristic The condition is seen less frequently since the introduction of penicillin than formerly There is a low-grade chronic bone pain present, worse at night than by day The pain is very persistent In some cases superficial sequestræ occur In cases without secondary surface infection the use of bone drilling has been advocated as a means of relieving bone pain, but little advantage has been noted following this procedure, which has been tried on a few occasions The drill holes fill up again rapidly with bony material

Bone rarefaction due to avitaminosis is seen most often as a result of deficiency of vitamins D and C, osteomalacia and rickets result when the former is deficient for a prolonged time These conditions are seen in the tropics most often in patients who through chronic illness are confined to their rooms as noted by Jelliffe[3] The absence of synthesis of vitamin D by sunlight on the skin precipitates these conditions Patients suffering from scurvy show an irregularity of epiphyseal lines, subperiosteal hæmatomata and an increased tendency to hæmorrhage from mucous membranes There is hæmorrhage into joints in some cases Bone rarefaction also occurs and in some cases pathological fractures

The joint most often affected by scurvy hæmarthrosis is the knee There is [illegible] accident There [illegible] Other evidence [illegible] ess of the gums

Cases of bone rarefaction due to Paget's disease have not been noted in elderly patients in the tropics No cases of bone rarefaction due to the lipoid histiocytosis group of diseases of childhood have been recognised these are Hand-Schüller-Christian disease, Gaucher's disease and Letterer-Siwe disease

Ganglia about the wrist joint are uncomfortable, inconvenient and unsightly In most cases they arise from herniation of the tendon sheaths through the dorsal ligaments which hold the extensor tendons of the hand in position Operative removal of ganglia about the wrist joint is followed in a high proportion of cases by recurrence Conservative treatment by aspiration, injection of a sclerosing fluid, such as quinine and urethane, and application of a firm bandage and a plaster

is best accomplished by pushing a silver probe through the tunnel *from below* upwards and tying the thread stitch in the upper piece of tendon through the eye of the probe and withdrawing it downwards The two parts of the cut tendon are then sutured together again The capsule of the joint is closed, the soft tissues approximated and the skin closed very accurately by a subcuticular suture as this causes least keloid formation This skin area about the shoulder is particularly liable to keloid scar formation The patient keeps the arm in a sling for three weeks after operation Gentle movements are then started By this operation the head of the humerus is held in position by the tendon passing through it so that it cannot dislocate easily This operation can be commended as simple, safe and efficient for treatment of a very troublesome condition

MUSCLE DISEASES

There are certain inflammatory conditions of muscle rare in temperate areas of the world but comparatively common in the tropics The term "pyomyositis" is used to indicate an abscess starting within the substance of a muscle and subsequently spreading to surrounding tissues Approximately 95 per cent of patients suffering from this condition are males It is very rare in women The condition starts with the development of a deep-seated painful area, usually about the thigh or the scapular position A local boggy œdema is noticed with high fever and marked malaise There is seldom fluctuation suggestive of pus in the *painful area for one week or ten days after the onset of symptoms If the patient* is seen before pus is present the condition can be arrested in about 50 per cent of the cases by the administration of sulpha drugs or penicillin A single dose of Bayer 205 or antrypol B P also causes spectacular improvement This drug is recommended in cases of pemphigus where there is a bullous skin rash present and deep-seated abscess formation is a serious complication The results are often very remarkable in patients resistant to all other forms of treatment It is necessary to test the urine before Bayer 205 is given It is contraindicated if there is albuminuria present In cases of pyomyositis, once pus has developed it is necessary to evacuate it Drugs alone will not cause resolution at this stage These abscesses are in some instances of enormous size, covering the entire anterior *aspect of the thigh*, or in other cases from the scapular area to the crest of the ilium They often contain from 1 to 6 pints of pus, which is of a creamy colour, in some instances it has a greenish tinge *Staphylococcus pyogenes aureus* is almost invariably found in the pus on direct examination or on culture In some cases the pus is sterile, this is more usual in the abscesses formed late in the disease Traquair [6] investigated a series of eighteen cases of this condition and noted that the illness started with high fever and local pains before any swelling was apparent There may be one or more abscesses present He considered penicillin the drug of choice in treatment, but that sulpha drugs were also helpful Subclinical scurvy was considered a possible causative factor Burkitt [7] also investigated a number of these cases and considered that the condition was a true myositis with muscle degeneration and pus formation He investigated the illness relative to several tropical diseases—filariasis, ankylostomiasis, malaria, sickle cell trait, trauma,

thickened sole and heel on the shoe because of the unsightly appearance it produces If they suffer from low back pain due to a short limb and treatment is called for, it has been found helpful to use football studs in the sole of the shoe (Fig 218) on the side of the shorter leg By this method three quarters of an inch can be gained by using long studs, and these are not so obvious to other people as are a thickened sole and heel. There is very little increase in weight of the shoe so raised

Because of the shallow nature of the socket of the shoulder joint, recurrent dislocation is a frequently encountered and troublesome condition Patients request operative treatment for the condition In the absence of extensive experience of orthopædic surgery the Blundell-Bankart operation is difficult to perform and

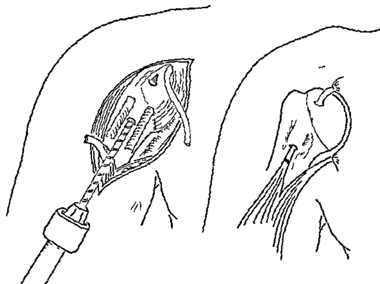


Fig 219
Diagrams of Nicola's operation for recurrent dislocation of shoulder joint

unpredictable in its results In view of the risk to axillary structures with this operative procedure, it is considered that Nicola's[4] operation as recommended by Mercer[5] is more suitable It is simpler and safer, and the results have been uniformly good Through a deltopectoral incision the shoulder joint is exposed The joint capsule is initially opened by cutting through the ligament forming the roof of the tunnel over the edges of the bicipital groove which houses the tendon of the long head of the biceps brachii muscle The incision is extended up through the capsule of the joint exposing the head of the humerus The long head of the biceps tendon is divided at the lower end of the groove and a retaining thread suture inserted into each of the divided ends A drill hole of sufficient calibre to accommodate the biceps tendon is then bored from the floor of the bicipital groove to the highest point of the head of the humerus (Fig 219) A small circle of cartilage is removed over the drill hole The cut tendon attached above to the top of the glenoid cavity is threaded through the bone from above downwards Thus

of injection treatment by unqualified persons for the purpose of financial gain Little attention is given to asepsis, and as a result patients are sometimes brought to hospital with fulminating injection abscesses in the gluteal area or the arm Following this form of unskilled treatment the patients are invariably in an extremely ill condition and are in some instances moribund when they enter hospital Marked jaundice is often present and there is a high irregular temperature suggesting septicæmia Delirium is usual It is advisable in these cases to administer large doses of a wide-range antibiotic drug to control the infection before any attempt is made to evacuate the abscess The patients, being very ill, have usually taken little food during the past few days and there is marked acidosis present Sodium bicarbonate and glucose in solution should be given by mouth if the patient can take it Alkaline glucose can otherwise be given per rectum It is a considerable advantage to give the patient 1 pint of intravenous Peristan N (Bayer preparation), which has a marked detoxicating action in septic cases This preparation is different from Peristan alone, which is a colloidal blood isotonic plasma substitute containing 4 per cent of polyvinylpyrolidone in physiological solution If Peristan N is not available intravenous saline glucose is helpful It is advised that this form of infective muscle abscess should be opened under local anæsthesia with a small dose of adrenaline added A 1-in incision is adequate in most cases, initially at least This allows escape of infected fluid under tension It is not wise at this stage to break down loculations within the cavity The pus evacuated contains mixed organisms

The three drugs which when injected intramuscularly are followed most often by abscess formation, are mepacrine, penicillin in oil and emetine Mepacrine for intramuscular injection is supplied in ampoules in powder form Two different-sized ampoules are available, those containing 0 12 gm and those containing 0 36 gm If this preparation is given intramuscularly in a dose of 0 1 gm to an adult abscess formation is unlikely to occur If 0 2 gm is given an abscess is formed on rare occasions, but if 0 3 gm is given an abscess is likely to form in not less than 10 per cent of the cases It is considered that the dose suitable for intramuscular injection in an adult is 0 1 gm, or one-quarter of this dose, 0 025 gm, for a child The difficulty can easily be circumvented in urgent cases by giving mepacrine intravenously The dose should be half the intramuscular dose, 0 05 gm for an adult and 0 0125 gm for a child Mepacrine should in no instance be given other than by mouth unless the patient is unconscious or desperately ill A mepacrine abscess is caused in most cases by the mepacrine leaking back from the intramuscular position to the fatty layers of the buttock, or due to the injection not being inserted sufficiently deeply

Abscess formation following the use of penicillin in oil was a troublesome condition when this preparation was first introduced It is now less frequently seen. The abscess was due to the oil, not the penicillin The inflammation caused was low grade, and in some instances the oil was evacuated as much as one year after the original injection was given A considerable quantity of unchanged oil was removed in many of the cases

Emetine is an efficient drug for the treatment of the vegetative forms of *Entamœba histolytica*, and it has merited a rightful place as an efficient therapeutic

general debility and bacteræmia (staphylococcal) There was evidence that all the above factors were higher in patients with pyomyositis than in a control group of patients without abscesses No single factor could be considered causative in itself The three most prominent factors in all cases were primary bacteræmia, minor or major trauma and general debility Burkitt considered that sulpha drugs were of very limited value in treatment Penicillin was not available for use in his cases Abscesses were opened as they occurred Small incisions were recommended as large ones caused unnecessary pain and healed slowly Patients with pyomyositis showed a relatively high incidence of sickle cell disease Most patients with this illness enter hospital with a large fluctuant abscess already present The mortality rate from this condition is approximately 10 per cent In most cases which are first seen at a late stage from three to six abscesses develop They extend over a period of from six to eight weeks Having personally dealt with many of these cases the following observations are made If a patient complains of localised pain in a muscle, and has fever and malaise, pyomyositis should be suspected It is advised that if the patient's urine is free from albumin or contains only a light trace that an initial dose of Antrypol, 1 gm, or Bayer 205 should be given intravenously This is followed by a course of sulpha drugs and one injection of long acting penicillin (1 million units) If pus has not already formed the condition settles down in approximately 75 per cent of the cases so treated If pus develops sulpha drugs have little obvious effect on the course of the abscess and the same is true of penicillin It would, however, seem reasonable to give both of these drugs in view of the advantage which is obvious in early cases—who knows, the patient might not be worse without them In some cases there is obvious œdema present and it is difficult to determine if fluctuation is not starting On a few occasions in an attempt to find pus at an early stage an incision has been made into these inflammatory areas The appearance of the muscle was very remarkable In each case the red brown colour of healthy muscle was replaced by a rather transparent gelatinous looking mass with the appearance of brown latex rubber On being incised the muscle did not bleed at all, but there was a free flow of serous fluid from the cut muscle There was some bleeding from the skin incision It was quite obvious that there was no free flow of blood through the muscle There was complete ischæmia The impression was gained that the condition is due to some form of vascular obstruction whether this be in the arteries or the veins No blood being present suggests that there is an arterial obstruction The subsequent changes present are thought to be the inevitable result of this infective vascular condition Adjacent muscles were of the normal red brown muscle colour They showed some evidence of œdema but no pus formation If there is an obvious area of deep seated inflammation present and there is difficulty deciding whether there is pus present or not, it is advisable to insert a wide-bore exploring needle, No 14, and aspirate with a syringe If no pus is detected this saves an unnecessary incision

Because of the outstanding success in the treatment of yaws with novarsenobenzol there is a great belief amongst village people of many tropical areas that the most effective treatment of all conditions is by injection of some sort This preference for injection has been much abused, and there is a widespread practice

any part of the body, but are most common about the trunk, a typical position being round the scapula (Fig 221) The swelling is usually diagnosed as a lipoma In areas of the world where guinea worm is encountered all patients thought to have a lipoma should be interrogated as to whether they have or have not had guinea worm infection at some time in the past An error in diagnosis can be avoided by inserting a large bore needle into the mass and aspirating to see if pus is present or not Guinea worms remain in the tissues without giving rise to symptoms in many cases They are found quite incidentally when the patient is X rayed (Fig 222) for some other condition, the worms showing as a calcified mass of typical appearance

In the late stages of trichinosis the worm *Trichinella spiralis* becomes encysted in the muscles giving rise to chronic myositis The muscle pains usually follow



Fig 222
X ray photograph (right) knee area showing calcified guinea worm in the tissues

a febrile illness of uncertain origin as the condition is difficult to diagnose in the acute stage There is a marked eosinophilia present in the blood in these cases This condition has not been recognised personally on any occasion although looked for several times

There is a peculiar condition seen occasionally in West Africa where a patient develops marked calcification of the temporal muscle There is swelling of the side of the temple causing a peculiar asymmetry of the head Chronic discomfort results This seems to be a localised form of myositis ossificans The cause of the condition is not obvious and no form of treatment has been found to influence it It has been seen on several occasions

agent Abscess formation following emetine injection rarely occurs, but when it does appear it is extremely painful There is very extensive inflammation without much pus formation until a late stage In view of this risk it is considered that emetine by injection should be given preferably for only three or four injections in colonic amœbiasis until the urgent symptoms are controlled This should then be followed by a course of bismuth emetine iodide by mouth in capsules Emetine injections give a better result in cases of skin ulceration with *E histolytica*, and





FIG 220 FIG 221

Fig 220—X ray photograph of calcified cysticercoids in thigh muscles

Fig 221—Child with guinea worm abscess of scapular area She is pointing out site of original guinea worm on the right leg

it is wise to give the full course of injections if the patient shows no severe local or general reaction

Inflammatory conditions in muscles are in some instances due to parasitic invasion by various worms or their embryonic forms They are here mentioned only in brief as they have been dealt with elsewhere Sparganosis is a muscle abscess due to a form of tapeworm infection This condition has been seen personally on only three occasions in West Africa It is more common in Asia than Africa Cysticercosis is the encysted or hydatid form of the pig tapeworm *Tænia solium* Fig 220 shows an X-ray photograph of the thigh muscles of a patient seen in West Africa who suffered from this condition Many calcified cysticercoids are visible Guinea-worm infection gives rise to a low-grade encapsulated abscess in the tissues, between the muscles probably in most cases rather than in the muscles The term "guinea worm cyst" is frequently used These chronic abscesses usually occur about one or two years after the original infection They occur in

a serious danger in obstetrical cases with retained placenta, it causes shock and collapse

Congenital cardiac defects have been encountered on rare occasions only and are seldom likely to be a matter of concern in surgical cases

Hæmangiomata are frequently seen in infants, the condition is considered later Circoid aneurysm (Fig 223) is most common following injuries by metal foreign bodies about the thigh or temporal areas Arteriovenous aneurysm is best treated by excision of the arteriovenous communication if the collateral circulation is adequate Pulsating exophthalmos is in most cases due to malignant disease *affecting the retro-ocular vessels* In dealing with traumatic aneurysm of the popliteal artery, Thomas [13] advises that following operation on the vessel a routine unilateral lumbar sympathectomy should be undertaken in these cases because of the risk of peripheral vascular deficiency following operation on the main artery of the limb, this is a sound practice In one case of popliteal aneurysm operated upon personally a bed sore developed on the patient's heel and was very slow in closing This might have been avoided had lumbar sympathectomy been undertaken following the operation on the blood-vessel Extra nursing care also might have prevented this complication

F [illegible] effect on peripheral vessels It is an extract of a [illegible] occurs on rye Taube [14] notes that as well as the [illegible] al vessels, causing gangrene of the toes and fingers in some instances, there is an associated mental deviation and mania seen in some patients Cases of ergotism usually occur in small epidemics as, in most *instances, infected rye has been eaten by several persons from the same supply* Vasodilator drugs, such as Priscol, are beneficial in relief of the spasm present Where gangrene occurs limited surgery is necessary to deal with the damaged tissue below the line of demarcation Gelfand [15] *describes primary tropical phlebitis,* which simulates in some respects thrombophlebitis migrans as seen in Europe, but the fact that it seems to run in small epidemics suggests that it is not the same condition and is more likely to be of infective origin

A series of cases personally encountered were noted in Accra in 1946 where within eight weeks six patients developed a swelling of the hand followed by dry gangrene There was an initial complaint of swelling about the base of a finger and pain on flexion of the metacarpophalangeal joint An infective tenosynovitis was suspected On incising the area of maximum swelling which seemed to [illegible] and swelling and [illegible]

multiple tendons It was necessary to amputate the hand in some of these cases, other patients lost one or more fingers A condition of this sort had not previously been encountered The absence of pus formation was remarkable On investigating some of the later cases the lining cells of veins removed showed inclusion bodies of the rickettsial type Fisher [16] also noted the presence of inclusion bodies in *cases of thrombophlebitis* Hughes [17] found rickettsial disease in goats in the Gold Coast, and on investigating the condition he examined other animals for rickettsiosis He found a high proportion of the rats caught locally suffered from

CARDIOVASCULAR DEFECTS

A patient's fitness to stand an operation is always a matter of concern to those undertaking surgery It is essential that the patient should have an adequate blood volume and a high hæmoglobin level before surgery is undertaken The condition of the heart and blood vessels is of paramount importance Edington [8] carried out a very thorough autopsy investigation on 3,645 subjects and concluded that cardiovascular disease was less common in indigenous subjects in West Africa than in a comparable group in temperate climates He found no evidence of rheumatic endocarditis Disease of the coronary vessels was considered rare Arteritis was found to be the most common cardiovascular disease detected in this investigation On microscopic examination the appearances of the vessel walls suggested changes of spirochætal origin Whether these were syphilitic or due to old standing yaws was not determined Hyperpiesia is relatively common in West African subjects and is noted clinically often at a relatively early age Endomyocardial fibrosis has been reported from East Africa by several workers Gelfand [9] in Rhodesia, Williams, Ball and Davies [10] saw many cases in the Kampala area of Uganda With extensive experience in West Africa, Hawe [11] notes that the condition is not present in the Accra area of Ghana as judged by clinical and post mortem examinations Coronary thrombosis is seen very rarely in African subjects as compared with European patients and is an exceptionally rare complication following surgical procedures in the former Trowell and Singh [12] express the same opinion Post-operative embolism is equally common in European subjects operated upon in tropical areas and in Europe As opposed to this, post-operative embolism in indigenous subjects is very rare indeed The three greatest predisposing factors in the production of embolism are infection in the operative field, stagnation of the peripheral circulation and dehydration in the patient European patients seem very unwilling to take adequate fluids following operation They also do not like moving about freely in bed Both these factors are probably influenced by the fact that European patients have a greater tendency to vomit than African patients, and to take fluids or move about in bed aggravates this tendency, hence the risk of embolism. African patients drink relatively large quantities of water following operation unless they are particularly ill They seldom vomit, and unless restrained usually get out of bed on the third day if not under direct observation This is actually not a bad thing and seldom does any harm, it even has advantages It is much better to show satisfaction with the patient's obvious progress than to reprimand him Only in the case of fracture must early ambulation be prevented lest refracture should occur It is advised that when European patients are operated on in the tropics a measured quantity of fluid should be allocated to the patient to ensure that the intake is adequate To use a beverage of the patient s choice is much the best way to get him to take the fluids It is desirable to hold a small stock of anticoagulant drugs because of the risk of embolism in European patients The most common form of embolism encountered in indigenous patients in the tropics is fat embolism, this usually occurs following operations on bones The risk is particularly high in cases of fracture of the neck of the femur treated by operation Amniotic fluid embolism is

Internal hæmorrhage due to this condition has been reported by Wilkinson [18] It is of the nature of a thrombocytopenia and allied to the purpura diseases It has been seen personally on only two or three occasions It is rare in West Africa

NEUROGENIC DYSFUNCTION

A large number of physical defects interfering with motivation are caused by disease primarily located in various parts of the nervous system, the brain, spinal cord or the peripheral nerves being the site of the pathology In some instances the neuromuscular junction is defective There are five main groups of abnormalities which affect any of the sites named these are tumours, infections, degenerations, vascular defects and congenital abnormalities The elucidation of nervous diseases of somatic type gives ample scope for diagnostic ingenuity Tumours, whether benign or malignant, give rise to physical signs by reason of increasing pressure on surrounding structures or interference with local blood-vessels The effects are most marked if the growth is within the cranial cavity, because of the limited possibility of expansion without interfering with the blood-vascular circulation within the brain or the cerebrospinal fluid system Parasitic invasion by various forms of helminth give rise to symptoms resembling those of tumour formation and rank as space-occupying lesions, there are secondary inflammatory reactions round lodged parasites which aggravate the symptoms and signs Pressure effects are also seen within the spinal cord, as in the brain, due to tumour formation, parasitic helminthic invasion and inflammatory conditions such as poliomyelitis Extraneural pressure effects are seen in cases of intervertebral disc prolapse Tumours of peripheral nerves are rare

Somatic weakness affecting an arm or a leg, if caused by intracranial pathology, shows a characteristic time interval between the time of onset of symptoms and the time of obvious weakness of the part, depending on the nature of the causative pathology The "Unit Rule" is most valuable and easy to remember as an aid to classifying the likely cause of somatic weakness due to intracranial lesions Considering the time of onset of the symptoms and the appearance of the developed paralysis the following units of time are relevant

Weakness occurring within ONE MINUTE suggests an embolism
Weakness occurring within ONE HOUR points to intracranial hæmorrhage
Weakness occurring within ONE DAY (twenty-four hours), cerebral thrombosis
Weakness occurring within ONE WEEK indicates an inflammatory condition
Weakness occurring *within ONE MONTH is usual with malignant tumours*

The location of the weakness depends on the site of the lesion present Weakness of arms or legs due to birth injuries is apparent in most cases from the time the child is born Their *nature is seldom in dispute, many children suffering* from intracranial hæmorrhage at birth die soon after delivery, or are stillborn A traction injury of the brachial plexus following difficult breech extraction gives rise to an Erb-Duchenne paralysis of the arm The limb, though weak, is held with the elbow extended and in the internally rotated attitude Midbrain birth injuries give rise to conditions of spasticity inco-ordination and aphasia Cortical

an active rickettsial disease In one patient, who died with multiple thrombo inclusion bodies were found in the lining cells of the internal jugular vein is thought that in many instances tropical phlebitis may be due to rickettsi of some sort Treatment of these cases with primary tropical phlebitis is b undertaken with terramycin or chloromycetin, to arrest the inflammatory proce Thrombosis of the inferior vena cava is sometimes seen Fig 224 shows a patie with this condition

Fournier's gangrene of the scrotum is secondary to thrombosis of the centra ascending vein of the scrotum The condition is most often of streptococca origin There is moist gangrene of the lower two-thirds of the scrotum Gangrene of the scrotum sometimes occurs if a bilateral hydrocele of large size is operated



Fig 223



Fig 224

Fig 223—Circoid aneurysm of the blood vessels of the scalp
Fig 224—Dilated veins of epigastric system secondary to thrombosis of inferior vena cava

upon on both sides at the same operating session The condition is invariably associated with some infection in the operative field

Ainhum, or ring toe, had been considered by some authorities as a vascular isease affecting the digital blood-vessels of the foot, but it is more likely to be ue to the secondary constricting effects of fibrosis associated with a mycotic fection in the interdigital cleft and around the base of the toes

Varicose veins of the legs are much more common in men in the tropics than men They show no special characteristics relative to tropical diseases The de of treatment, whether by operation or injection, is decided upon depending he patency or otherwise of the femoral veins in the inguinal area, as judged arrying out a Trendelenburg test Quinine and urethane have been used as erosing injection material with uniform satisfaction, and there have been no ourable reaction notes as a result of the use of quinine by injection

Onyalia is a rare thrombocytopenic disease in which there is a dark hæmorrhagic nd blisters about the mucous membranes of the mouth and hypopharynx

intracranial lesion must be considered In cases of this condition the typical ova of Paragonimus is found in the sputum, and if found the brain symptoms may reasonably be attributed to the same parasite Epileptic patients are seldom sent to surgical departments for investigation or treatment, but those working in remote tropical areas appreciate the impracticability of giving continuous medical treatment with any regularity over a prolonged time Epilepsy is a very serious illness, and the patient is liable to complications due to the sudden onset of unconsciousness He may fall in dangerous situations, such as on a river bank, in a busy street or beside a fire One suggestion is given here for a simple form of surgical treatment which is of advantage in selected cases If there is no obvious cause found for the epilepsy and attacks are frequent and severe, status epilepticus, it is advised that the patient should be observed carefully during a fit to see if possible where the fit starts or finishes These are usually the same place It is difficult to observe the initial twitching as the movements are usually generalised before the patient is observed The final twitching is more easily observed as the fit passes off This usually occurs about a hand, a foot or the face It is possible in almost all cases to decide on which side the final jactitation occurs The precipitating intracranial lesion is invariably on the opposite side of the brain to the side on which the twitching was last noted Epilepsy is in many cases caused by a cortical lesion in the form of an adhesion or a scar, and in addition circulation disturbance adjacent to it There is usually a raised intracranial pressure associated with the fits, it is probably a precursor of the attack By ligating the internal carotid artery in the neck, on the side of the estimated lesion, the intracranial pressure can be lowered on that side This operation, originally suggested by Professor Stiles in Edinburgh,

seventeen cases operated upon there was spectacular improvement The patients had, in most instances, few or no subsequent fits There were serious complications in two patients and one patient died The complications were considered to be due to spreading thrombosis above the site of ligation of the internal carotid artery One patient had a loss of speech about twenty four hours after the operation, although he spoke freely on the evening after the operation was performed He remained aphasic for many months following the operation One other patient developed hemiplegia on the opposite side of the body In view of the serious nature of epilepsy and marked improvement in fourteen of the patients the operations were considered justified In view of the obvious risk of spreading thrombosis, it is advised that an injection of heparin or dicoumarol should be given daily for two weeks following this operation It would be unwise to undertake this operation on patients over the age of 40 in view of the increased risk of hemiplegia with deterioration in the vascular structures after this age

The cause of the muscular atrophies and muscular dystrophies have not yet been clearly elucidated, but there is some evidence to suggest that they may be in some cases due to inflammatory conditions comparable to poliomyelitis In view of the comparatively recent recognition of toxoplasmosis as a widespread disease, it is considered that some cases require investigation for this condition by

hæmorrhage from rupture of the sagittal sinus during delivery causes neonatal death in a high proportion of cases.

Penfield and Paine[19] suggest that 36 per cent. of all epileptic children have suffered from intracranial birth injuries as a result of difficult delivery. It is important in epileptic children to ascertain if the birth was spontaneous or assisted by obstetrical forceps. The epileptic fits do not occur in some cases until the child is several years old. The investigation of epileptic cases with modern apparatus has shown that in a high proportion of cases there is a specific local lesion present to account for the condition, and the term "idiopathic" is now becoming obsolete. In the tropics intracranial parasitic helminthic infections play an important part as a causative factor in epilepsy in both children and adults. The nature of these



FIG. 225
X-ray photograph showing calcified cysticercoids in the muscles of the neck.

infections will only be indicated here briefly as they have already been discussed in Chapter 5. Cysticercosis is important. In some of these cases a calcified cyst can be noted within the brain. In others no intracranial opacities may be apparent, but cysts can be seen in the muscles of the neck, as in Fig. 225, and if present it can be concluded with fair likelihood that others exist within the brain and are the cause of the epilepsy. This is particularly the case when the fits come on for the first time in adult patients. Epilepsy occurs in many cases before calcification of the cysts is apparent, as deposition of calcium is a late sign. Coenurus cysts also give rise to intracranial lesions of the space-occupying type and cause epileptiform manifestations and raised intracranial pressure. This form of small tapeworm parasite is very comparable to the larger and more frequent hydatid cyst of the tapeworm *Echinococcus granulosis*, which also occurs within the brain on rare occasions.

Shih, Chen and Chang[20] have reported seeing seventy-six cases of cerebral paragonimiasis within five years in China, that is, more than one case per month. In certain areas of the world where this form of parasite exists this type of

where breathing is embarrassed Early splintage of weak limbs is beneficial The recent introduction (1958) of antipoliomyelitis vaccine to the under-20 age group of the population has caused a spectacular fall in the incidence of this disease in England and the United States of America After the acute stage of the disease physiotherapy is beneficial The initial paralysis of limbs usually decreases to about 50 per cent of its original extent

Physiotherapy and re-educational muscular adaption should be employed for at least two years before operative surgical measures are considered for increasing the functional efficiency of limbs With limited physiotherapy available in country

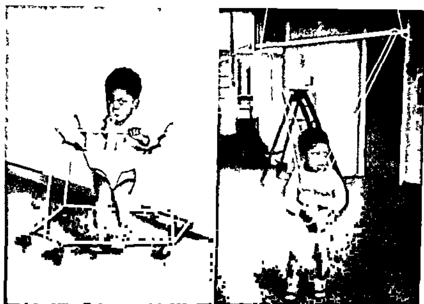


Fig 226—The 'Walkie Pen frame in use for a child with leg weakness due to poliomyelitis
Fig 227—Child with weak leg due to poliomyelitis being treated by '*trouser suspension*

weak legs by the
le by A Robins &
is most valuable
The child can be placed in it with safety, ... rest and freedom from an invalid infant in a manner which is beneficial to the baby The child is virtually sitting in a suspended saddle The child can push itself about with the better leg while exercising the weak limb A wooden frame on this pattern can be made, but seldom equals the original light metal model The simplest and cheapest yet efficient method of assisting a child with weak legs is to use a trouser suspension swing (Fig 227) An ordinary strong pair of bathing pants with a wide perineal band is made to fit a small child and suspended with modified braces A band of strong cloth is put round the child at the level of the axillæ and stitched on to the braces at the shoulder position on both sides A long piece

the Sabin Feldman dye test and radiography as suggested earlier (Chapter 18) The type of case under suspect is the defective child who has never walked In many of these cases there are speech defects, congenital ocular abnormalities and muscular dystrophies—calcification in the choroid plexus is seen on radiography in some of the patients

Myasthenia gravis is associated with thymic abnormalities Mild cases are much improved by the use of prostigmin preparations Severe cases have usually a gross hypertrophy or tumour formation present in the thymic tissue and thoracotomy is required for their removal Lenticular degeneration of the midbrain is associated with marked tremor of the Parkinson type If the tremor is very marked, grossly incapacitating the patient, specialised neurosurgical measures may be undertaken in a small number of the cases with advantage

Abnormalities within the spinal cord in most cases cause both motor and sensory changes Spinal cord tumours, either benign or malignant, are very rare Helminthic parasitic invasion of the spinal cord is a well-recognised condition in many tropical areas Garduno and Carpio [21] report three cases of Paragonimus infection of the spinal cord presenting with symptoms suggestive of poliomyelitis with, in addition, pulmonary symptoms The patients died, and on post-mortem examination Paragonimus parasites were detected encysted in the lumbar area of the cord If neurological and pulmonary signs are both present the characteristic ova of this parasite should be looked for in the sputum In areas of the world where paragonimiasis is encountered this cause of leg paresis should be considered

Temporary weakness of the legs is in some cases associated with sickle cell disease in patients of African origin The symptoms occur during a blood crisis The condition simulates poliomyelitis in some respects and may cause much confusion, there being muscle pains, headaches and fever associated with the leg weakness

Prolapse of an intervertebral disc gives rise to a form of pressure neuritis A high proportion of disc lesions (90 per cent) are treatable by conservative means In the remaining 10 per cent removal of the prolapsed disc through a unilateral laminectomy approach gives spectacular results, but the cases must be well selected Conservative treatment by prolonged rest for four weeks in a plaster-of-Paris cast should be insisted upon before operative measures are considered

Anterior poliomyelitis is by far the most common spinal lesion seen in the tropics giving rise to interference with ambulation This condition occurs with about equal frequency in African and European children in West Africa in my experience Gelfand and Millar,[22] working in Liberia, reported poliomyelitis to be relatively common in European children and low in African children in that area Walker [23] reported a relatively high incidence of the disease amongst European children in Kenya, much higher than in Europe, but a relatively low rate amongst African children A history of having had an intramuscular injection of some sort, usually mepacrine, before the onset of the paralysis is very usual in African children No doubt the injection was given to a sick child whose blood contained malaria parasites—as most of them show—and it was concluded that malaria was the cause of the pyrexia Early treatment of poliomyelitis is by antipyretics, sedatives, adequate nursing and mechanical respiratory apparatus

because of the risk of interfering with growth in leg length The continued use of external metal supports is less practical A spring can be used between the toe of the boot, and an ankle strap to counteract the drop foot Adequate vitamin tonics are beneficial to all patients suffering from neuritis of any form There are many forms of peripheral neuritis—toxic, alcoholic, avitaminitic and infective The pressure neuritis due to prolonged and obstructed labour is very common in the tropics It is frequently seen in association with vesicovaginal fistula Dropped foot, due to leprosy neuritis, is quite common, and this disease must be looked for, particularly as there are associated skin changes or a facial nerve paresis Much improvement can now be expected in this form of dropped foot in the tropics with the use of the sulphone group of drugs Few cases of advanced leprosy come to hospital for surgical treatment Considering those cases operated upon it is noted that the condition seldom causes surgical complication following operation Healing has been in all cases good, contrary to expectation in some. In view of the improved outlook with treatment by modern drugs, leprosy patients should not be deprived of the advantages of surgery where it is indicated

There is a close association between spina bifida and hydrocephalus Many cases with congenital spinal cord defects have weakness of the lower limbs Operative treatment of spinal meningocele is successful in a small proportion of the cases operated upon Cases of meningomyelocele have in almost all cases leg paralysis and these cases are not benefited by surgery Where a meningocele of the lumbar area of the spine is operated upon and removed, it is an advantage to overlap the muscle defect at the site of the mass removed by a semilunar flap of aponeurosis from each side which remains attached medially so that its blood supply is maintained These cases should be closed completely and no drainage used because of the risk of infection In cases where the operation is successful it is noted that in a high proportion of the cases the child subsequently develops increasing hydrocephalus which is ultimately fatal There is in these cases a discrepancy in the rate of formation and absorption of the cerebrospinal fluid This excessive rate in fluid formation is sometimes dealt with by diathermy coagulation of a part of the choroid plexus within the lateral ventricle on one side This operation is a highly specialised neurosurgical procedure and not within the scope of those practising general surgery with limited facilities

Gupta [21] has made a valuable suggestion for treatment of cases of hydrocephalus He has undertaken a series of operations in which he inserted a rubber catheter into the lateral ventricle of the brain Through a 1-in scalp incision and a small trephine opening the brain is approached and the lateral ventricle is punctured, possibly with a trocar and cannula, permitting of insertion of the catheter A second opening is made in the upper cervical region and the external jugular vein exposed A subcutaneous tunnel is then made from the scalp incision to the neck incision and the catheter threaded through it The catheter is tied into the vein and the wounds closed The vein can be tied off above without detriment to the patient The results of these operations were encouraging This is a simple operation which gives a practical and constructive approach to an otherwise difficult problem He points out the following advantages

1 The operation is easy to perform and the risk is low

of light rope is then tied to one shoulder ring and put over a high support, such as the branch of a strong shady tree near the baby's home, the loose end is then tied to the other shoulder ring at such a height that the child is suspended as on a swing, but with the feet just touching the ground If suspended from a good high support the child can move about over a distance of several square feet and play there with other children It is an advantage to put a separating rod between the cords to keep them away from the sides of the child's head This is the most practical inexpensive form of home physiotherapy and is recommended This



FIG 228

Child with leg weakness due to poliomyelitis nursed on mother's back, causing contractures of limbs in bad position (Photo by kind permission of Mr J K M Quartey, F R.C S)

form of treatment is a great advantage as a method of getting the invalid child removed from the mother's back where it otherwise sits in a paralysed state (Fig 228) The legs are widely abducted, flexed at the hip and the knees, and the feet are in the propped position Severe flexion contractures develop at all joints, due to neglect, and ultimately operative treatment is required to rectify them if early treatment has not been instituted

In neglected cases of leg paralysis in adults the leg can be made more useful in some cases by performance of an arthrodesis at the knee joint If the muscles of the hip joint are not seriously involved the leg becomes more useful when it is rigid at the knee position When arthrodesis is undertaken prolonged plaster fixation is needed because of the somewhat decalcified condition of the bones due to trophic changes Arthrodesis is not advisable in children who are still growing

23

Bites of Animals, Snakes and other Noxious Agents

ANIMAL BITES

HUMAN bites constitute one form of animal bite for which admission to hospital is necessary in a higher percentage of the cases than is usually required following bites of other animal species Women bite much more frequently than men This occurs during fighting in most instances, it is in some cases a manifestation of sex feelings Most human bites are seen about the hands and the face Legal proceedings are sometimes instituted on grounds of grievous bodily harm or disfigurement Human bites are prone to gross sepsis if inadequately treated at an early stage If sepsis implicates the tendon sheaths, or the joints of the fingers, some permanent disability is likely to occur These wounds almost invariably contain large numbers of spirochætes and fusiform bacilli In neglected cases of human bites about the fingers (Fig 229) the loss of a finger is usual In some cases spreading sepsis necessitates an amputation through the forearm Before the introduction of the antibiotic drugs for the control of sepsis, it was usual to use novarsenobenzol and sulpha drugs as being most suitable because of the mixed infection present with a predominance of *spirochætes and fusiform bacilli Where penicillin is available it is now considered* the drug of choice

Buts [1] reviewing a large series of cases of human bites admitted to hospital advocates treatment along the following lines

1 Clean the part well with soap and water—detergent soaps are best
2 on for f nction
3
4 ot advised
5 Bites about other parts of the body should be excised and sutured

The organisms most frequently found on culture of human bite wounds are

bites in Yugoslavia during twenty four years there were no cases of tetanus reported The mouth probably does not provide conditions suitable for the growth of tetanus germs The subject of rabies has been dealt with in Chapter 18 The list of animals harbouring this virus infection on occasions can be seen from many articles referred to

2 No very highly specialised instruments are required
3 It can be undertaken in places where no expert neurosurgeon is available.
4 The overflow cerebrospinal fluid returns to the general circulation
5 No special investigations needed to locate the site of obstruction in ventricular system

This operation has not been attempted personally A plastic catheter might with advantage replace the rubber catheter if available

REFERENCES

1 WILLIAMS, G & KIRKALDY-WILLIS, W H (1955) Treatment of congenital talipes equino varus in East Africa *E Afr med J* 32, 215
2 BEET, E A (1956) Rheumatic heart disease in Northern Nigeria. *Trans roy Soc trop Med Hyg* 50, 587
[illegible]
10 WILLIAMS, A W, BALL, J D & DAVIES, J N P (1954) Endomyocardial fibrosis in Africa, its diagnosis, distribution and nature *Trans roy Soc trop Med Hyg* 48, 290
11 HAWE, A J (1954) Endomyocardial fibrosis in Africa Correspondence *Trans roy Soc trop Med Hyg* 48, 308
12 TROWELL, H C & SINGH, S A (1956) A case of coronary disease in an African *E Afr med J* 33, 391
13 THOMAS, H O (1956) Traumatic aneurysm of femoral artery *W Afr med J* 5, 22
14 TAUBE, F (1957) Ergotism in Central Africa *Cent Afr J Med* 3, 6
15 GELFAND, M (1949-50) Tropical primary phlebitis *Trans roy Soc trop Med Hyg* 43, 439
16 FISHER, A C, FISHER, M & LENDRUM, A C (1947) Tropical primary phlebitis *J Path Bact* 59, 405
17 HUGHES, M H (1953) Rickettsial disease of goats in the Gold Coast *Ann trop Med Parasit* 47, 299
18 WILKINSON, J (1953) A fatal case of onyalia in Kenya *E Afr med J* 30, 69
19 PENFIELD, W & PAINE, K (1955) The result of surgical therapy for focal epileptic seizures *Canad med Ass J* 73, 515
20 SHIH, Y-C, CHEN, Y H & CHANG, Y C (1958) Paragonimiasis in central nervous system *Chin med J* 77, 10
21 GARDUNO, D M & CARPIO, D (1950) Paragonimiasis A report of three cases with pulmonary and neurological symptoms *J Philipp med Ass* 26, 253
22 GELFAND, H M & MILLAR, M J (1956) Poliomyelitis in Monrovia *Amer J trop med Hyg* 5, 791
23 WALKER, A J (1956) Poliomyelitis in Kenya *E Afr med J* 33, 169
24 GUPTA, S M (1950) New surgical treatment for idiopathic hydrocephalus *Indian J med Sci* 4, 85

patients are extremely ill Early control of the sepsis with antibiotic drugs is most important and blood replacement by transfusion is an obvious advantage Gaping *wounds should be loosely* approximated only after adequate cleaning Complete closure of wounds is inadvisable

The hippopotamus if hunted sometimes charges, and in the marshy ground where these animals are usually found it is difficult for the hunter to get away The animal usually bites the man and runs on The part gripped is commonly at the level of the patient's crest of ilium In most cases it is fatal If the injury is not lethal the patient essentially requires treatment for shock, there is extensive bruising of soft tissues Stitches are required in some cases only



FIG 230
Crocodile bite of left leg with disarticulation at position of left knee

Crocodile bites are comparatively common in districts adjacent to large tropical rivers They are sustained most often by persons bathing, fishing or washing In some instances persons are attacked as they leave a canoe at a river crossing Crocodiles most frequently bite an arm or a leg (Fig 230) It is usual following biting in deep water for the crocodile to roll over in a violent manner while holding the limb In a high proportion of the cases the limb is disarticulated through one of the large joints—the knee or the hip in the case of the lower limb and elbow or shoulder in the case of the arm In spite of the gross trauma in these cases the patient frequently lives The twisting off action causes the main blood vessels to tear some inches below the position of the disarticulation, as seen in the photograph This allows the vessel to contract and so the initial hæmorrhage is arrested more quickly than might be expected The tooth marks of the crocodile bite in this case can be seen in the skin of the thigh This patient had the leg amputated at the mid-thigh position and made an uneventful recovery In all forms of animal bites the patient is benefited by sedatives, antibiotic drugs and early

Because of the excellent blood supply of the tissues about the face, tissues torn by biting should be sutured back in position after adequate cleaning, even though there is only a small residual pedicle of tissue holding the flap in position. In almost all cases they "take" like a full-thickness tissue graft if sutured back within an hour of the initial accident. In one instance a patient was admitted to a large hospital in West Africa with the left ear bitten off completely, the policeman who accompanied the patient to hospital brought the avulsed ear with him wrapped in a piece of the local newspaper. There was considerable difficulty and dispute before he was willing to surrender the ear, we wanted to suture it back in position, but he wanted it to show as "Exhibit A" in a law case. The ear was ultimately reluctantly surrendered and after adequate cleaning was carefully repositioned and



FIG. 229
Human bite of finger with terminal interphalangeal joint infected

sutured in place. The ear "took" very well so the woman was very satisfied. The ear though retaining a good appearance became somewhat smaller than the normal ear. The cosmetic result was none the less very satisfactory.

Monkeys, not being very aggressive animals, seldom bite human beings—they bite only when being captured or handled in captivity against their wishes. Monkey bites seldom cause serious spreading sepsis. A small number of cases of encephalomyelitis following monkey bites have been reported by Breen, Lamb and Otaki[3]. A vesiculopapular rash occurs in the locality of the bite and this is followed by a lymphadenitis. Some days later symptoms develop which simulate polioencephalitis. These are thought to be due to a herpes-like virus transmitted by the monkey. The virus is now termed monkey "B" virus. The condition, though rare, is rather characteristic.

Lion and leopard bites are often associated with extensive clawing injuries and the patient is extremely ill due to a combination of wounds. Gross sepsis is usual in these cases and there is a high risk of anaerobic infections and gas gangrene. Such wounds are frequently followed by marked hæmolytic jaundice and the

occur in Europe, south of Germany Snake bite is much more common in tropical and subtropical areas of the world than in temperate zones Rocky and sandy arid areas are particularly liable to have many snakes in them Australia has a very large number of snakes and a very high proportion of them are venomous, but the rate of snake bite is relatively low because of the sparsity of human population apart from the large towns The incidence of snake bite in Burma, the Malay Archipelago and India is high relative to other parts of the world There is a death rate of approximately 2,000 cases due to snake bite in Burma

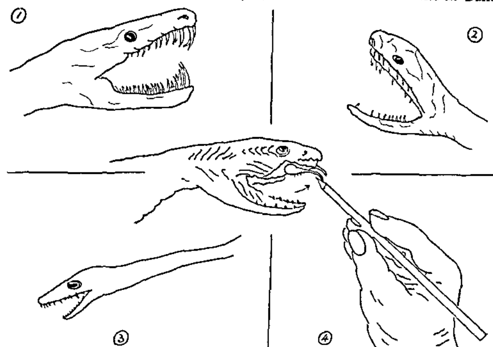


FIG 231

Diagram of snake heads showing tooth disposition

1 Python—non venomous
2 Fixed front fanged snake
3 Fixed back fanged snake
4 Swivel front fanged snake

annually The death rate from this cause in Ceylon is between 300 and 500 per year The loss in India and Pakistan is probably in the level of 20 000 a year, their percentage loss is lower than that noted in Burma but the population of India is much larger—350 million as opposed to Burma with a population of 20 million

As there are over 2 500 named snakes in the present zoological classifications and the number is constantly increasing, it is obviously quite impossible to expect doctors to identify snakes with any degree of accuracy Ghana has at least 80 different types of snakes (Cansdale [6]) Villiers [7] working in Dakar, refers to 120 different types in West Africa Snakes are classed as *poisonous snakes* only if they have cannulated teeth, which are also called *fangs* It is usually necessary to wash the mouth of a dead snake in water before the cannula in a tooth can be seen,

blood replacement before operation is undertaken for repair of the structures damaged

Rat bites are most often seen in derelict pauper patients The risk of rat-bite fever is a known hazard though this is a rare condition Bat bites in Trinidad and British Guiana have been known to transmit rabies of a type where there is a high incidence of myelitis The condition produced is more like that seen in the rare neuroparalytic accident cases produced by the attenuated or "fixed virus" used for antirabies injections Rabies in cattle due to infective vampire bat bites is becoming a serious problem in South America (1959)

SNAKE BITE

There is at present no means of making an accurate estimate of the number of snake bites which occur annually in the world No figures are available of the total death-rate from this cause Most deaths occur in under-developed areas of the world where there is neither registration of births, deaths nor total population Not more than one in ten persons bitten by snakes goes to hospital for treatment, native medicine is more popular in many under-developed parts of the world There are probably not less than 75,000 deaths from snake bite annually considering all parts of the world The figure of 40,000 deaths annually, as stated in many articles on the subject, is undoubtedly much too low Swaroop and Grab [4] of the World Health Organisation estimated the world snake bite death-rate as 40,000 annually, but added significantly, "excluding China, the U S S R and Central European countries" They suggest a figure for all Africa as 400 to 1,000

The first case of snake bite personally seen was noted in the Lake District of England in 1931 where as a house surgeon we admitted to hospital a small boy aged 10 years, bitten on the right hand by an adder Adders are poisonous snakes of the viper type There was a marked swelling about the face, the area of the bite was painful and swollen, the child was in a collapsed state when first seen, with poor pulse, shallow fast respiration and cyanosis He vomited frequently The child recovered in spite of no antivenene being available for treatment Knowing practically nothing about snake bites, no estimations were made to determine the blood clotting time or the presence of hæmolysis The patient was treated by warmth, stimulants and a dose of intravenous calcium gluconate

Several countries in Europe, particularly those in the southern parts, return a small annual death-rate from snake bite (ophidism) Lieske [5] reported fourteen poisonous snake bite cases from Germany between 1951 and 1956 The number of deaths was nil The percentage mortality rates due to snake bite in certain European countries is given as follows

	Per cent		Per cent.
France, 1944-47	21 5	Spain, 1946-48	5 3
Italy, 1944-48	17 6	Scandinavia, 1946-50	0·4

Presumably there was a small number of deaths in each of the areas mentioned The *Vipera berus* is the only poisonous snake in Germany, it also occurs in England and is sometimes termed "Northern Viper" The vipers *V aspis* and *V ursini*

B Fixed Fangs (200 named varieties)

Fangs		Venomous Snakes	Risks	Causes of Death
1 Back	Land	Tree snakes	All mainly neurotoxic + + +	Respiratory paralysis
2 Front	Land	Cobras		
3 Front	Land	Rhinghals		
4 Front	Land	Mambas		
5 Front	Land	Coral snakes		
6 Front	Land	Kraits		
7 Front	Land	Australian snakes		
8 Front	Sea	Sea snakes		

C Movable Fangs (300 named varieties)

Fangs		Venomous Snakes	Risks	Causes of Death
1 Front	Land	Vipers with pit between eye and nose	Proteolytic + + + Hæmolytic + + Neurotoxic +	By blood and tissue damage
2 Front	Land	Vipers No pit between eye and nose		

Comparable classification given in extracts with zoological names and popular names where known

The identification of pythons constitutes little difficulty They are usually large snakes (Fig 232) with many large teeth, but none of them are cannulated The special zoological characteristic which distinguishes pythons is the presence of labial pits, but this for us is not very important

The venomous colubrid snakes (Fig 233) all have cannulated teeth which are fixed in the upper jaw They may be placed as "front fangs" at the front of the mouth or as "back fangs" at the back of the mouth as seen when looking *at the snake with its mouth opened It should be realised, however, that the* term "back fangs" applies to fangs placed at the back of the mouth opening, but if seen on a snake head skeleton are only about half-way back along the upper jaw *Tree snakes (Fig 234) have small fixed back fangs, while the cobras, the* mambas and the sea snakes all have rather small fixed front fangs

The third group of venomous snakes—the vipers (Fig 235)—all have large *"front fangs" which swivel forward This method of classification is most* important, as on the fang type the snakes can be divided into distinct groups which correspond fairly accurately with the main clinical manifestations of the various syndromes seen in patients bitten by snakes To see if the fangs are fixed or movable it is necessary only to open the dead snake's mouth and use a probe or a lead pencil (Fig 231), testing by exerting pressure from behind if the fangs can be swung into the forward position With vipers the fangs swing forward and on being released return back to their normal retracted resting position

Back fanged snakes are otherwise called tree snakes and are as venomous as front-fanged snakes, but are less dangerous only because they seldom get the back fangs into the person they bite, due to the less advantageous position of these teeth

for most of the snakes brought to hospital with patients bitten have been killed with sticks and stones and the mouth is often soiled by mud, blood and vegetable debris In small venomous snakes the fangs are quite small and it is necessary to use a strong magnifying glass to see the minute opening of the cannula It is usually a short distance from the end of the tooth on its anterior aspect Non-poisonous snakes may bite and cause an uncomfortable lacerated wound which bleeds freely, but no venom is injected These wounds have no higher risk associated with them than those due to other causes No references have been found to tetanus occurring in cases of snake bite

There are several families of non-poisonous snakes The names of these families are intentionally omitted here as they are irrelevant to our immediate purpose Pythons do not have cannulated teeth, they are, therefore, not poisonous snakes, but they are certainly dangerous snakes in that they kill their prey—small animals and even people on rare occasions—by winding their coils round the body of their victim and causing asphyxia by constriction Boa constrictors come into the python class though they are not so large as many of the other pythons

The most satisfactory method of determining to which of the three main clinical groups of dangerous snakes a snake belongs is to examine the dentition, noting the presence or absence of fangs and if present whether they are fixed or movable (Fig 231) Fixed fangs are further divided into front fangs and back fangs Movable fangs are in all instances front fangs occurring in the viper groups A simple "clinical" classification is given omitting all zoological terms for simplicity No classification is perfect, but that given below is quite practical for doctors having to deal with cases of snake bite, even though they have no zoological interest in reptiles It corresponds more closely to some of the older zoological grouping than the more recent schemes adopted which take into account structural characters more of academic interest than practical medical importance

(*A*) Pythons have many large teeth but *no fangs* They kill by constriction only

(*B*) Colubrid snakes have teeth and *fixed fangs* present They inject neurotoxic venom

(*C*) Vipers have *swivel front fangs*, killing by hæmolytic and proteolytic venom

THE A.B.C CLINICAL METHOD OF CLASSIFYING SNAKES
ALL ZOOLOGICAL TERMS OMITTED FOR SIMPLICITY
ALL SNAKES HAVE TEETH

A NO FANGS (2 000 named varieties)

Non venomous Snakes	Risks	Causes of Death
Dangerous (non venomous) snakes		
1 Constrictors	By constriction	Asphyxia
2 Pythons	By constriction	Asphyxia

When the simple "clinical" classification is appreciated, the more complete classification along the same lines, but giving the well-known zoological names as appended in the extracts, can be perused with advantage

Pythons inject no toxin when they bite, as they may do They occasionally cause a ragged wound of the part bitten, but they kill essentially by constriction They are classed as non-poisonous snakes having no venom, but they are still dangerous snakes

Fixed-fang snakes are all poisonous, injecting neurotoxin into their victims The degree in which they are poisonous varies in the different types The tree snakes are least dangerous of this group, but only because the fangs which are placed posteriorly do not usually grip the one bitten The amount of poison injected by any venomous snake is very variable, and if two people are bitten within



Fig 236



Fig 237

Fig 236—Viper Echis carinatus, or carpet viper, a very dangerous snake of West Africa
Fig 237—Extensive tissue destruction of left leg in neglected viper bite case

a few minutes of each other, the second patient sometimes dies, but not the first and the reverse may also happen The signs and symptoms of neurotoxic poisoning are due to depression of the nervous system, there is very little local pain or reaction at the site of the initial injury and tissue destruction does not occur about the site of the bite If the patient can be tided over the first forty-eight hours after the bite, recovery is usual If the venom of any type of poisonous snake enters the venous circulation through a large vein, as on the back of the hand, death invariably occurs within a few minutes of the bite The rare occasions on which this happens accounts to a considerable extent for the marked fear people have of snakes of any sort Cobras spit venom at the eyes of their assailants—it causes severe conjunctivitis and keratitis (see Chapter 28)

Vipers of all varieties are snakes of the "swivel-front-fang" type They are highly dangerous reptiles Viper poison on entering the tissues has a marked proteolytic action causing gross local tissue destruction, the venom also exerts serious hæmolytic action and in some instances a neurotoxic effect, but to a small degree only, this latter action being very slight relative to that noted in the cases of venomous colubrine snakes where the toxicity is primarily neurotoxic The

The principle can be illustrated very well as when you bite a slice of buttered bread you see after the bite the impression of the first four upper teeth on each side,





FIG 232 FIG 233

Fig 232—African python a very large snake, length in this case 15 ft

Fig 233—Venomous colubrid snake of the fixed front fang type cobra mamba group

but the second bicuspid teeth and the molars are all too far back to grip the slice of bread Nevertheless, the back teeth are subsequently used to chew the food It is exactly the same with the tree snakes, they are poisonous snakes, but the venom seldom enters their victim initially on biting Small animals bitten are



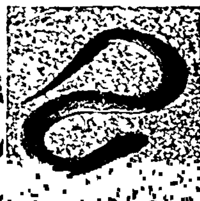


FIG 234 FIG 235

Fig 234—Tree snake of the fixed back fang type, gold and black snake of Malaya

Fig 235—Viper swivel front fang type Night adder (*Causus rhombeatus*)

gripped and pressed back in the mouth thus coming into range of the back fangs which then inject the venom There have, however, been several cases of death in persons bitten by back-fanged snakes—typically, the boomslang of South Africa Doctors who have little or no zoological interest in snakes should always examine snakes dead, not alive

as judged by the bite mark, is not reliable One might identify the major group of snakes to which a specimen belonged if carefully prepared plaster cast impressions were made from skeleton specimens of snakes' jaws, but in practice a glancing shot from a terrified snake does not in fact create patterns as illustrated in books All one can say is that if there is more than one puncture mark, it is not likely to be due to the sting of a scorpion, but the reverse is not necessarily true The position of the punctures can often be demonstrated if under a good light the painful area is squeezed gently so that serum is expressed Very few patients stung by a scorpion will let you handle the injured area, as it is much too painful The pain comes on immediately on receipt of the bite Colubrid snake bites are not unduly painful, but viper bites become increasingly painful about half an hour after receipt of the bite

The position of snake bites is found to be in most series 80 per cent on the lower limb (Fig 239) and 20 per cent on the upper limb (Fig 243) Wood[9] noted 80 8 per cent and 19 2 per cent respectively and none elsewhere In the case of children the distribution is much more frequently on the hands, the figures reaching about 50 per cent for the upper and the lower limb Snake bite other than on the limbs is very rare, not exceeding 3 per cent

Whereas the overall death-rate from snake bite in India is 17 9 per cent of those bitten, 88 9 per cent of the fatal bites have been inflicted by vipers and 4 8 per cent by cobras and mambas[10] The remaining loss, 6 3 per cent, was due to other types Haast[11] states that the bite of the blue krait type of colubrid snake is considered to be 100 per cent fatal in America He was himself, however, bitten by this snake after many years working with snakes and he refused treatment, considering that he had developed a marked degree of non specific immunity from previous snake bites of various forms He was extremely ill, but ultimately recovered and gave an excellent description of his neurotoxic illness A somewhat similar account is given by Vogel[12] in Czechoslovakia, who was bitten on different occasions by a horned viper, a Siberian halyx, a pit viper and ultimately by a banded krait, a colubrid whose neurotoxic venom causes marked drowsiness, weakness and interference with muscles of deglutition and speech In fatal cases there is ultimately respiratory paralysis

Reid[13] sustained a bite by a sea snake in Malaya and recorded his symptoms following this adverse experience His manifestations were complicated by a severe serum reaction following the use of antivenene in treatment The special feature which distinguishes sea snakes is their laterally flattened rudder-like tail They also have a cleft lower jaw in most cases They are about 9 ft long They are found in the oceans between East Africa and Malaya as well as on the east side of the Malay Archipelago Sea snakes are very dangerous when they bite, causing neurotoxic symptoms The mortality rate following their bites is given as 25 per cent by Reid[14] There were thirty sea snake bites admitted to hospital at one station in a single year (1953), and twenty nine in 1954 Most patients are fishermen who constantly have to remove sea snakes from their nets These patients often do not go to hospital and the local people are rather reluctant to give information regarding snake bites till confidence is engendered by mutual understanding

death-rate from snake bites varies according to the type of snake inflicting the bite The vipers generally cause a higher mortality than that caused by colubrine snakes Those working in different areas become familiar with the predominant type of dangerous snakes in their particular district In West Africa the carpet viper or *Echis carinatus* (Fig 236) gives rise to the highest death-rate due to hæmolysis and internal hæmorrhage from the mesenteric vessels Many of the non-fatal bites by this snake cause loss of part of a limb due to gross local tissue destruction in neglected cases (Fig 237) The case was treated by amputation at the mid-thigh position (Fig 238)

Many snake bites occur in patients walking barefooted in the dark Patients do not see the snake, but are conscious of having stood on something which felt like a frog and then they feel the acute pain of something biting them This is





FIG 238 FIG 239

Fig 238—Same case as Fig 237, following amputation left mid thigh position
Fig 239—Appearance of right foot four days after untreated viper bite

particularly so in cases of bites by the night adder which is a viper In some cases patients complain of a snake bite believing that this is the case, when in fact they have been stung by a scorpion When a patient is bitten or stung by an unseen creature it is wise to examine the bite or sting area with a good light to see if the perforating injury corresponds to a single puncture wound, as inflicted by a scorpion, or two punctures as inflicted by most vipers, where there are usually two punctures only about 1 cm apart, there are usually no other tooth marks in viper bites

Corkill *et al*[8] have recently made the important observation that some vipers of the genus Atractaspis have fangs which swivel forward independently If striking at an object on their right side they use the right fang only and if on the left, the left fang only is used Many bites of vipers of this genus show only one fang mark on the skin of the victim at the site of the bite It is thought likely that when the snake bites something directly in front of him the two fangs are elevated With colubrid snakes there are more than two puncture marks corresponding to fangs and teeth posterior to them An assessment of the type of snake inflicting a bite,

The molecular weight of viper venom has been found to be in the level of 20,000 and because of this high molecular weight absorption from the site of the bite is relatively slow and occurs through the lymphatics only and not the blood stream direct The cobra and mamba venoms are of a much lower molecular weight, in the level of 5,000 They are for this reason absorbed much more quickly and through the blood-vessels Viper venom unless injected direct into the blood stream via a large hand or leg vein, where a fang enters the vein directly, is absorbed slowly and takes up to about one hour to enter the general circulation, in some cases even longer The slow absorption allows of sufficient time for the proteolytic elements to act locally and these cause gross destruction of the tissues adjacent to the site The whole arm or leg becomes swollen after twenty-four hours in untreated cases (Fig 243) where no attempt has been made to localise the poison



Fig 241



Fig 242

Fig 241—Viper Nasicornis with distinctive markings 18 in long

Fig 242—Gaboon viper with distinctive markings a thick heavy snake 3 ft long

There is marked histolysis and histamine production with accompanying shock The venom has an anticoagulant factor in it and also one causing hæmolysis which is very characteristic of viper venom As well as local hæmorrhagic changes in the tissues causing hæmorrhagic blisters, there are in some cases distant hæmorrhages These occur from the gums and into the peritoneal cavity as seen *post mortem* in fatal cases The peritoneal cavity is filled with blood stained serum from the mesenteric vessels In some instances this gives an appearance like that seen with an internal hæmorrhage due to a ruptured ectopic pregnancy—quite extraordinary when first encountered Late hæmorrhages into the nervous system are also a serious risk A case of this gross destruction of local tissue is seen in Fig 237 where a boy entered hospital five days after a viper bite of some sort Viper bites are accompanied by much pain which becomes severe about half an hour after the bite, not immediately as noted with scorpion bites Cobra and mamba bites swell very little, if at all, they are not painful after the initial puncture discomfort has passed off as is the case with an intramuscular or subcutaneous injection

Jutzy *et al*[15], working in the Panama zone, noted a mortality rate of 12 7 per cent of patients following snake bite The mortality as a result of bites by pit vipers is very high, being between 30 and 40 per cent Pit vipers (Fig 240), that is, those having an anatomical depression or pit between the eye and the nostril, occur mostly in Central and South America, they occur to a lesser extent in Asia Some of the pit vipers (*Crotalus atrox*) have a cartilage like tip to the tail which periodically breaks off

In Africa all vipers are of the non pit variety The snake bite mortality personally noted in West Africa has been 10 per cent, but as only the more serious bite cases are brought to hospital, the true mortality is probably lower than this in most areas Archambault,[16] however, working in North-west Ghana, encountered sixty-two snake bites in two and a half years at one station, average one per fortnight The death-rate was about 30 per cent In many of his cases the viper *Echis carinatus* or carpet viper was identified This is one of the most dangerous snakes in Africa, it has a wide distribution over the whole continent and extending into the Middle East, through Persia and into India The length is only about 18 in, but it is a relatively thick snake for its length Most of the vipers have a skin which looks a size too large for the body, making them appear rather "baggy" The marks are very distinctive in most cases, as noted on the horn-nosed viper (Fig 241) and the Gaboon viper (Fig 242)



FIG 240

Pit viper of the Crotalidæ family rattlesnake of Central America

Efrati and Reif,[17] observing sixty five viper bites in Israel, found that the venom of vipers, Crotalotoxin, has a chemical formula of the nature of $C_{23}H_{54}O_{21}$ It has a specific toxin closely allied to saponin which is of the glucoside class of substances It also has a proteolytic action as well and a hæmolytic factor It will be remembered that unripe ackee fruit contains a saponin like glucoside in its juice which when eaten by young, undiscerning children produces a state of drowsiness very like that seen in cases of neurotoxic poisoning of snake bite The children become drowsy and go into a state of coma from which they cannot be awakened, they die from respiratory paralysis Cortisone might be very beneficial to these children as it is in cases of snake bite of the neurotoxic type Viper bites are characteristically proteolytic and hæmolytic and only to a very small extent neurotoxic in the case of the African vipers The neurotoxic element seems to be more pronounced following the bite of the pit vipers found in America and parts of Asia An enzyme in the venom has a hyaluronidase-like action causing rapid spreading of exudates and liquefaction of proteins and rapid absorption of histamine The absorption of histamine accounts for the phenomenon of shock, at least in part in these cases

The patient must be kept very warm in bed to compensate for the loss of heat from the immersion of the limb in very cold water

Because of the difficulty of identifying the individual snakes concerned and the fact that in many instances the snake is not caught, it is advised that a general method of treatment be adopted to deal with all snake bites which gives adequate coverage for any type of snake It should be remembered that although vipers have predominantly histolytic and hæmolytic venom, there is also a lesser neurotoxic element present in some instances which makes treatment for all elements desirable In the case of the venomous colubrid snakes no evidence of local tissue damage follows their bites about limbs, but the delicate epithelium of the eye is injured if cobra venom enters it A very painful conjunctivitis develops

Antivenene prepared in the Research Institutes contains a high titre antivenene in horse serum Different establishments make different antivenenes depending on the type most suitable for the treatment of snake bites caused by snakes found in the area they supply In most instances a polyvalent serum is prepared from a snake of the viper class and one of the cobra mamba group The serum antivenene supplied by the Medical Research Institute at Johannesburg is made from the venoms of the puff adder, the Cape cobra and ringhals The serum has a specific action against the venom of the snakes from which it is made, but it has, to a lesser extent, a non-specific action against other snakes A monovalent antivenene against *Echis carinatus* is also available

In view of the high risk of serum sickness following the use of antivenene in horse serum, it must be considered whether serum should be given as a routine procedure or only in selected cases It should certainly not be considered mandatory to give antivenene in all cases Reid [13] having suffered from a severe attack of serum sickness on receiving antivenene, given following a sea snake bite, is of the opinion that serum should be used with great caution From personal experience, having tried both methods—using serum in all cases of snake bite for five years and no serum at all initially in any case for five years, except where obvious toxic symptoms were present when the case was first seen—it was decided that it was reasonable to withhold serum unless characteristic snake bite symptoms develop or are present when the case is first seen, this is, however, a personal opinion and might be at variance with those of greater experience It certainly saves unnecessary serum sickness

If a patient has the snake brought to hospital after he has been bitten, identification of the main group of snakes to which it belongs is usually possible, though the individual species is not always obvious With this information available, the type of symptoms which may be expected can be looked for If the snake has not been killed and brought with the patient, the type may often be concluded from the symptoms noted in the patient With venomous colubrine bites the site of the bite shows little or no swelling The immediate bite perforation is painful, but the pain passes off within half an hour as does that of a hypodermic needle injection, and the patient experiences marked heaviness and tiredness There is drooping of the eyelids, the gait is of the staggering variety and the patient often falls down if not supported The head almost invariably hangs down as though the patient were falling asleep Speech becomes weak, inco ordinate and

Mohammed and Zaki[18] noted that the rate of release of histamine and so production of shock in cases of viper snake bite is markedly decreased by reduction of the locally available oxygen The shock in burns cases due to histamine release is very like that seen in cases of viper snake bites The appearance of a snake bite of the hand causing swelling and blisters of the forearm is extremely like a severe case of second-degree burns The rate of proteolytic action is like many chemical actions which are directly proportional to the temperature at which they

ased

° C

ghth

of its original activity At 7° C the venom activity is reduced to one sixteenth of its original potency A temperature of 7° C corresponds to the temperature of iced water, just a little above freezing Decreasing the temperature of the part by



FIG 243
Viper bite of left hand untreated, two days' duration, showing blisters and swelling

chilling is precisely what is required to stop the destructive action of the chemical poison

The principle of decreasing the rate of chemical action by lowering the temperature is used in inactivating chemically mechanised time bombs before dismantling the fuse apparatus to make them safe for removal and demolition The firing mechanism is dependent on the action of corrosive acid on a metal plate acting at atmospheric temperature If the bomb is reached quickly and the firing mechanism immediately frozen by ethyl chloride or carbon dioxide, the chemical action is arrested and the fuse mechanism can then safely be removed This freezing action is very comparable to that required in the case of locally acting snake venom of vipers Viper bites, if seen early, should be frozen immediately with ethyl chloride as an emergency procedure and then the affected part placed in iced water at a temperature of 5 to 8° C. for at least twenty-four hours If on return to normal atmospheric temperature the part again shows evidence of increased pain or local swelling the chilling should again be used for a further twenty-four hours After forty-eight hours the venom is almost completely and permanently inactive It is then absorbed very slowly during the forty-eight hours and at a rate the body can cope with, without serious detriment to the tissues or red blood cells

reduced In some instances a transfusion may be necessary at an earlier stage if the hæmoglobin level becomes low within twenty-four hours

The neurotoxic action of cobra-mamba snake venom is associated with a profound disturbance of the blood potassium-sodium balance The sodium is much reduced and the potassium is abnormally raised The effect of an injection of cortisone, 25 mg for a juvenile and 50 mg for an adult, is to adjust this chemical blood balance reducing the blood potassium, which is the main factor causing the drowsiness and flaccid paresis It therefore acts as a specific antidote for neurotoxic snake bites of all sorts Britton [19] noted the beneficial effect of adrenal cortical extract in treatment of snake bite in West Africa Barnicot and Ladell [20] made a careful study of the physiological effects of ACTH in West African subjects particularly with reference to the regulation of sodium and potassium levels

Ganatra *et al* [21], working in India, carried out an experimental study on mice to estimate the effect of hydrocortisone and antivenene singly and in combination, to assess their relative merits They injected mice of a fixed weight with measured doses of snake venom alone—all the mice died To a further batch of mice they gave a covering dose of antivenene and a dose of venom following this To a third batch they gave antivenene followed by venom, but in addition a dose of hydrocortisone To a final batch of mice they administered a dose of venom and hydrocortisone alone The results were then studied They concluded that antivenene and hydrocortisone both gave protection against snake venom poisoning, but that the results where hydrocortisone alone followed the venom were better than where venom and antivenene alone were given (Extract 2)

Polyvalent antivenene has proved to be a valuable form of treatment and the death-rate in cases of snake bite has been considerably reduced since its introduction It confers a degree of passive immunity of short duration in the same way as do other forms of hyperimmune serum in cases such as diphtheria and suspect hydrophobia cases Treatment by antivenene is much more expensive than when chilling and cortisone preparations are employed Schottler,[22] working in Brazil, carried out experiments on mice and found that antivenene given intravenously was much more effective in treatment than when given intramuscularly Serum sickness may occur following the use of antivenene whether given by the intravenous or the intramuscular route The use of cortisone and an antihistamine drug in addition to the serum reduces the reaction Personally no advantage has been noted following the use of locally injected antivenene The impression is gained that it is even harmful when used in the limb adjacent to the bite area It is considered that local injection of antivenene should be abandoned altogether Minton [23] is of the opinion that antivenene does not arrest local tissue damage at all in cases of viper bites

Many patients who suffer from viper bites incur very serious disability due to local tissue destruction It is essential in these circumstances to institute special active measures at the site of the bite to localise and minimise the action of the poison Incision and suction with introduction of chemicals such as potassium permanganate are all considered to be of no value and should be given up The immediate application of a tourniquet above the site of the bite is advisable till the part can be chilled The arrest of the action of viper venom

slurred Respiration is shallow and laboured Loss of voice occurs in some cases There is a terminal loss of sphincter control and sometimes convulsions

With viper bites there is a marked and painful local reaction about the site of the bite The pain increases considerably after about half an hour, and within one hour there is obvious local swelling Within twenty-four hours in untreated cases sero-hæmorrhagic blisters develop and the local lymphatic glands become painful If a specimen of blood is taken from a vein at this stage it will be noted that the clotting time is markedly increased and on separation of the red blood cells the serum will show some degree of hæmolysis The normal clotting time as judged by putting venous blood into a gallipot is about five minutes The blood will not be solid by this time, but it is getting obviously quite sticky and will not flow freely about the container If there is an anticoagulant effect present due to the snake venom the blood may show no evidence of clotting at all after fifteen or even thirty minutes It has personally been made a practice to take a sample of blood in these cases for three reasons the clotting time can be estimated, when the red cells have separated, whether clotted or otherwise, the presence or absence of hæmolysis can be detected, and the serum when separated is used for blood matching It is usual in patients suffering from viper bites, if they have received a toxic dose of venom, to find that the vein puncture bleeds unduly freely after removal of the needle with which the blood sample is taken Pressure must be applied to the puncture site for a longer time than is necessary in patients who have not suffered a viper snake bite If the clotting time exceeds fifteen minutes, it is wise to select a blood donor as in these cases a transfusion is desirable

Patients bitten by vipers usually recover, but of the small proportion who die the fatalities usually occur on the fifth or the sixth day Occasionally death occurs [illegible]

or two days they sometimes die at home, so for this reason requests for early discharge should be treated with caution It is wise to retain snake bite cases in hospital for at least one week Efrati and Reif,[17] noting a large series of viper bites in Israel, listed the frequency of individual symptoms and signs in their cases as follows (their figures have been reduced to percentages for ease of examination)

	Per cent		Per cent
1 Local swelling	89	6 Marked shock	40
2 Local pain	86	7 Pyrexia	40
3 Vomiting	55	8 Diarrhœa	35
4 Skin discoloration	51	9 Anæmia	31
5 Sero-hæmorrhagic blisters	46	10 Abdominal pains	29

Each of the patients had several symptoms present, hence the percentages

The hæmolytic action of viper venom continues for up to about seventy-two hours only, decreasing progressively It is therefore suggested that where a blood transfusion is arranged, the blood should not be given immediately but after forty-eight hours from the time of the bite, when the hæmolytic action is much

TROPICAL MARINE HAZARDS

The study of marine life has in the past been hampered by the difficulty of remaining beneath the surface of the sea without heavy diving equipment The recently introduced portable gas machines now make under-water swimming possible and investigations which were hitherto precluded The development of photography within the ocean has added greatly to pictorial records Marine study is progressing rapidly in this way and this new field of research has its medical aspects Consideration should be given at this stage to knowledge already accumulated even though slowly and at great risk This information collected can be applied to the problems now being investigated

The risks occasioned by marine life have a close resemblance to the dangers occasioned by the bites of animals and snakes, already considered The relative infrequency with which men come in contact with marine life makes such accidents comparatively rare, but they are none the less of interest The entwinement and crushing action of the octopus is a fair counterpart within the sea of killing on land by large snakes of the python class Most marine accidents occur when men are bathing or fishing Shark bites are in most cases fatal A small number of these accidents were seen at Bathurst in Gambia In one instance a shark bit off a man's head completely and the accident remained vividly in mind because of the fact that nobody could identify the deceased person without the head Nobody was missing from the local community and it was ultimately concluded that the victim was an itinerant labourer from a remote part

Sharks on occasions come into comparatively shallow water along bathing beaches Persons swimming have on occasions been lost by shark bites in water not more than 4 or 5 ft deep This risk has been very serious in certain areas of the world Close to Durban, Natal, at the Uvongo beach in 1958 an adult man and a boy were killed by sharks and another boy lost a leg A helicopter shark patrol is now in operation along this coast spotting sharks Some of the popular bathing beaches have been protected by shark nets , by their use in the first year of service 600 sharks were caught and since that time an average of 150 annually These enormous fish are a very serious risk to bathers and fishermen The danger [illegible] Oceans Sharks [illegible] pics This is the [illegible] disposed of into the sea Other large fish such as whales and swordfish take a lesser toll of human life

Many fish bites occur in warm lagoon waters which are only 3 or 4 ft deep Fish are plentiful in these places and fishing is most often by nets or inverted cane baskets The fishermen handle the fish freely and serious wounds are inflicted in some instances, usually about the hands Several fish bites have been personally encountered in a lagoon area in West Africa, where lagoon fishing has a ceremonial significance attached to it On certain days of the year several hundreds of local people go fishing on the occasion of a fishing festival Every year two or three serious fish bites are brought to the local hospital Fish bites cause serious lacerated wounds in most instances, very like wounds caused by broken glass Bleeding is

by chilling is sometimes called "cryotherapy," which means literally cold treatment This method of treatment is of greatest advantage in cases of viper venom poisoning where *the local destructive element is very disabling if not arrested quickly* If this is done the destructive action of the venom remains localised A small area of tissue may become necrotic It can later be covered by a small skin graft, but the loss is very localised, being over an area of about 1 sq in instead of up to the wrist or the ankle or in some cases even more Antihistamine drugs are a marked advantage in viper bites, they decrease the rate of release of histamine and reduce shock and toxic absorption Intravenous calcium gluconate is also of value in decreasing the calibre of the peripheral blood vessels Cortisone is advantageous in treatment of both viper and colubrine bites

The form of treatment recommended for snake bites of all forms is

1 Apply firm ligature above site of bite till it can be frozen by ethyl chloride
2 Freeze the part with ethyl chloride, then remove the tourniquet Follow this by immersion of the part in water from 5° to 8° C
3 The patient must be put to bed, given extra blankets and hot coffee with sugar
4 Give one dose of cortisone 50 mg and repeat six-hourly pending condition, 25 mg for child
5 Administer an antihistamine drug, benadryl parenteral 2 c c and repeat six hourly for one to two days
6 Take blood specimen from vein for testing clotting, hæmolysis and blood typing
7 Inject 5 c c of intravenous calcium gluconate
8 Coramine is then given if there is evidence of a poor pulse or lowered respirations
9 Give an injection of ergotamine tartrate in snake-bite cases with neurotoxic symptoms—also used for neurotoxic symptoms following scorpion stings and spider bites
10 Antivenene is given only if obvious toxic symptoms develop, not as a routine
11 Intravenous Peristan N is useful as having a specific detoxicating effect and 20 oz is administered if patient is toxic
12 Local surgery as required in late neglected cases of viper bites, with necrosis

Kapolin or heparin should be available if there is evidence of thrombosis as occurs occasionally in cases of mamba bites Because of the urgent nature of snake-bite cases and the alarm caused to the patients and the relatives, it is advised that each hospital should keep a snake-bite outfit stocked in readiness for treatment so that all requirements are available quickly as needed This saves delay in organisation of treatment and the minimum of alarm to the patient The contents of such an outfit as suggested are indicated in the extracts at the end of this chapter

it Severe paralytic cases showed considerable improvement following the administration of intravenous infusion with saline glucose

Ralls and Halstead,[27] working in California on eels transported from the Marshall Islands of the Pacific Ocean, investigated the poisons present following the cases of poisoning by eel meat The patients who ate the meat developed pins and needles in the legs and later ataxia and paralysis There was tightness of the muscles of the face and twitching Difficulty in swallowing was caused by muscular inco-ordination As well as the trismus present there was carpal spasm as in tetany The patients were mentally quite alert but anxious Intravenous calcium gluconate was considered helpful in relieving the muscular tonicity There is no mention of cortisone being used in treatment of these cases, which it is thought might have been an advantage, as is so obviously the case with snake bite where there are neurotoxic signs present

Poisoning of a somewhat comparable type to that seen in eel meat poisoning has been described by Romeyn and Haneveld [28] in patients after eating turtle meat Five cases were noted in Netherlands New Guinea The patients were very ill and two died, a 40 per cent mortality Several previous deaths were known to have occurred due to the same cause The patients suffered from dizziness, nausea and vomiting There was swelling of the tongue and tingling about the mouth and the throat They ultimately became drowsy Turtle meat is frequently eaten in that area of the world, but it usually does not give rise to symptoms The outbreak of poisoning has a seasonal occurrence as noted in the case of poisoning due to biting and stinging fish The same explanation of feeding on poisonous flowering marine vegetation is offered, but the reason is uncertain

There have been many cases of coral ulcers reported by Hicks [29] in patients bathing near the Mombasa area of East Africa They usually occur late in the year and the seasonal incidence is associated with the flowering season of coral plants with which the patients come into contact The coral has a stinging apparatus activated by a trigger mechanism An urticarial reaction occurs locally on contact and secondary infection is a frequent and serious complication The wounds are very slow in healing There is evidence of shock associated with the rash and patients seriously affected may collapse soon after contact with the coral There is a conspicuous failure of mental concentration for some weeks after the accident A specific poison has also been found in association with sea anemones

The stinging properties of jellyfish are well known The type called "Portuguese man-of war" is particularly toxic The sting is extremely painful and following it adults feel indisposed for several days If young children are stung the symptoms are very acute and severe on the soft skin There is urticaria in generalised form, the pulse becomes very poor and the respiration rises to 30 or 40 for several hours Vomiting is usual No deaths have been noted from this cause Sweet hot drinks are beneficial, stimulants and intravenous calcium are helpful as well as the administration of an antihistamine drug in small doses Adrenaline has not been used in these cases because of the patient's very feeble pulse and it was thought that it might be dangerous Coramine as a stimulant is safer

very free, causing considerable shock. No specific poisonous element was noted in the cases encountered

Mills [24] has contributed a most valuable and comprehensive article on poisonous fish in the South Pacific area Some fish have a poisonous bite due to a poison gland associated with their jaws as in venomous snakes In some fish there is a special sting associated with the dorsal fin or spine The bites and stings of these fish are not necessarily poisonous all the year round but at certain seasons only It is thought that this is due to the fish feeding on coral vegetation at the time of flowering It is possibly also due to seasonal poisonous plankton Poisonous fish bites give rise to neurotoxic symptoms in many instances Those noted by Mills were

1 Altered sense of taste
2 Frequently severe headaches
3 Muscular twitching of the face
4 Excessive salivation
5 Lowering of the pulse-rate
6 Alternating hot and cold feelings
7 General sense of lassitude
8 Heaviness of the lower limbs
9 Decrease in the knee reflexes
10 A feeling of pins and needles
11 Paralysis, cyanosis and death

There is a fair mortality, though most cases recover The wounds are very painful and there is local urticaria about the wounds, followed in some cases by necrosis Allergic reactions are usual These symptoms simulate closely the signs seen in certain cases of snake poisoning A list of poisonous fish as recorded by Mills is added in the extracts

Some shellfish also cause stinging and may have lethal effects some hours after contact Haneveld [25] noted injuries caused by garfish of the Belonidæ type in the Indonesia area Reid,[14] investigating cases of bite by sea snakes, noted that the members of this group caused neurotoxic symptoms, there was flaccid paralysis of the legs and marked trismus about the jaw simulating tetanus The distinctive characteristic about sea snakes is that the tail is flattened laterally in a rudder like manner Water snakes seen about rivers have a round tail and are usually harmless

There is a serious hazard associated with eating of eel meat in some parts of the world Khlentzos,[26] working in the Philippine Islands, reported seventeen cases of illness due to eating meat of the eel *Gynothorax flavimarginatus* The patients, having ingested the meat, noted an early tingling about the mouth and the lips, there was a sense of pins and needles about the mouth and weakness of the legs developed and finally paralysis Some of the patients developed a squint There was a starry gaze about the patients and purposeless movements, rather like cases of rabies, salivation was marked and sweating occurred The salivation was probably similar to that seen in cases of hydrophobia where because of pharyngeal inco-ordination the patients cannot swallow the saliva which therefore dribbles out of the mouth The laryngeal spasm is aggravated by saliva approaching the larynx in an uncontrolled manner The eel meat poison was thought to have a muscarine-like effect and atropine was used in helping to control

in the toxin as evidenced by the occasional occurrence of hæmoglobinuria following the sting Bleeding from the gums and hæmatemesis have also been reported

Bites of large spiders are in some instances dangerous This specimen (Fig 245) was found at the door of an operating theatre in Ghana, we caught it, gave it an anæsthetic and took this photograph The toxic effect of spider bites is described as proteolytic, hæmolytic, neurotoxic and icterogenic The well known "black widow" spider with several species is known to cause marked toxicity when it bites human subjects Most of the reports of these bites have been from the U S A, but Lucey,[33] working in East Africa, described a fatal case due to a black widow spider, *Latrodectus*, where a patient bitten died eight hours after the bite The spider was black with a crimson spot on the end of the abdomen There was marked pain and swelling about the bite area On post





Fig 244 Fig 245

Fig 244—Scorpion showing sting in sixth tail segment

Fig 245—Large spider of the Mygalomorphæ type, West Africa

mortem examination marked congestion was noted affecting the heart, lungs and liver Because of the known proteolytic action of spider venom antihistamine drugs are beneficial in treatment O Rourke[34] suggests the use of locally applied pyribenzamine cream 2 per cent, it being a preparation with antihistamine action comparable to caladryl cream It is generally considered that the neurotoxic action of spider venom has a particular affinity for the autonomic system and the use of ergotamine tartrate preparations may be of value The Antivenene Institute of America prepares a specific antivenene to counteract the poison of the black widow spider The firm of Squibb Ltd in America also markets black widow spider antivenom Intravenous calcium gluconate is considered beneficial in treatment

Wasp and bee stings are on rare occasions fatal There have been several reports in England in 1958 This occurs if the venom is unluckily injected into a large vein An acute anaphylactic reaction develops and fatalities are due in most cases to laryngeal obstruction associated with the acute laryngeal œdema Intravenous calcium is useful and subcutaneous adrenaline, 7 minims, should be

OTHER NOXIOUS AGENTS

There are many other forms of reptile, arthropod and insect life which cause nuisance and disease by bites, sting and contact irritation Not far removed from the snakes are reptiles of the lizard class In this group a reptile of the genus *Holoderma*, with two or three species, bites and introduces a neurotoxic poison through fangs which are fixed in the lower jaw, unlike snakes where the fangs are all placed in the upper jaw Following bites by *Holoderma* there is dyspnœa, neuromuscular paralysis and terminal convulsions This creature occurs in Central and South America No comparable bites by reptiles of the lizard class have been encountered in West Africa There have been a small number of known fatalities from bites of this reptile Treatment along the lines suggested for neurotoxic snake venom poisoning suggests itself but no opinion can be expressed further because of the absence of personal experience of these cases

Scorpions are noxious arthropods (Fig 244) They have a needle-like sting in the terminal segment of the tail They hide most commonly beneath heaps of stones and wood and under concrete ledges about old dilapidated buildings There are several named varieties of scorpions The length varies from between 5 and 20 cm, the 10 cm size being usual At the site of a scorpion sting there is usually a single skin puncture present, but the scorpion may sting more than once In snake bite cases it is more usual to find at least two perforation wounds, though this is not invariably the case The affected area of a scorpion sting is extremely painful and the discomfort is marked immediately from the time of the sting Patients are brought to hospital in a very distressed state following scorpion stings, but no fatal cases have been seen Some fatalities amongst young children have been reported where the body weight is low Lopes da Silva [30] noted eight fatal cases in children, but none in adults

Mohammed, Rohayem and Zaky,[31] experimenting with scorpion venom, noted blood changes in which there was a lowering of the blood sodium and raising of the potassium level present With these alterations there is associated neurotoxic symptoms as are also seen in cases of venomous colubrid snake poisoning Whereas the blood changes can be rectified largely by the use of cortisone preparations, Mohammed and Mahmoud [32] found that scorpion toxin has a special predilection for the sympathetic nervous system, and in these circumstances the additional use of ergotoxin preparations is considered a marked advantage, atropine was also helpful Injections of ergotamine tartrate and bellafoline were used The preparation dihydroergotamine methane sulphonate (DHE 45) was considered particularly suitable, being more stable than other ergot preparations The use of intravenous saline glucose is also beneficial in toxic cases

The patient comes to hospital essentially because of the local pain caused by the sting We have found that injection of 2 c c of 1 per cent procaine and morphia ¼ gr added in the region of the sting relieves the symptoms in almost all cases Stings about the hand give rise to the most severe symptoms and patients require bed rest and strong analgesics An injection of ergotamine tartrate should be given in addition in hand cases The toxin injected by the scorpion does not cause local breakdown in the tissues There is a slight hæmolytic factor present

a few days The larvæ of certain flies are on occasions deposited in the external auditory meatus of the nostrils of sleeping children and cause severe irritation as they develop Protection by nets during sleep and adequate toilet clears the condition

EXTRACTS

1 Classification of snakes with zoological and popular names

Harmless snakes (non venomous) having no fangs (Aglyphidæ) Approximately 2 000 types named Not of great medical importance

CLASS A —CONSTRICTING SNAKES dangerous but non venomous Large teeth present None of the teeth are cannulated (no fangs) (Aglyphidæ) They kill by constriction Manner of death of victim by compression and asphyxia

No 1	*Constrictor constrictor*	Boa constrictor
	Constrictor imperator	Emperor constrictor
	Constrictor occidentalis	Argentine constrictor
	Eryx jaculus turcicus	Spotted sand boa
	Eryx miliaris	Desert sand boa
	Eryx tataricus	Eastern sand boa
No 2	*Python curtus*	Short python
	Python molurus bivittatus	Dark Indian rock python
	Python molurus molurus	Indian rock python
	Python reticulatus	Reticulated python
	Python sebæ	African rock python
	Python regius	Royal python

[illegible] The fangs are given by B C

[illegible]

No 1	*Aparallactus anomalus*	No well known names attached as the back-fanged snakes are not very dangerous, seldom causing death by biting
	Aparallactus lineatus	
	Calamelaps unicolor	
	Dipsadoboa unicolor	
	Dipsadomorphus blandingii	
	Dipsadomorphus pulverulentus	
	Dispholidus typus	Boomslang or tree snake
	Dromophis lineatus	No well known names attached as the back fanged snakes are not very dangerous, seldom causing death by biting
	Dromophis præornatus	
	Elapops modestus	
	Leptodira hotambœia	
	Miodon acanthias	
	Polemon barthii	
	Psammophis elegans	
	Psammophis sibilans	
	Rhamphiophis togoensis	
	Rhamphiophis oxyrhynchus	
	Tarbophis variegatus	
	Thelotornis kirtlandii	Twig snake or vine snake
	Asia	
	Boiga dendrophila	Gold and black mangrove snake of Malaya

given An antihistamine drug should also be given if urticaria is apparent following stings Following bee stings patients feel cold and often complain of trismus not unlike that experienced during times of extremely cold weather

Bites by ants cause much discomfort. Accidents are sometimes caused indirectly to children, usually collecting mango fruit, who fall from the fruit trees as they are bitten In some instances bites about the scrotum occur at night in young male children There is much local swelling and a minute area of local necrosis at the site of the bite Bites are also sometimes seen about the soft tissues adjacent to the eye

The bites of certain large toads are known to be toxic to dogs and fatalities have been reported No cases have been noted in human subjects It seems that a specific toxin is produced as the animals die in a paralytic state and under these circumstances these very large toads may be a potential danger to children at least

Leeches cause painful bleeding if they attach themselves to the legs of persons wading through marshy places Following the removal of the leech there is bleeding due to the presence of an anticoagulant secretion called hirudin Dermatitis due to cantharides beetles is a painful source of blistering There is local pain and vesication soon after contact with the beetle If the blistered area is scratched the fluid in the vesicles causes further blisters where the fluid comes in contact with previously undamaged skin A hand contacting the cantharides vesicles may rub the eye and cause conjunctivitis Moth dermatitis due to the scales of certain moths coming into contact with the exposed skin is a form of skin irritation of an urticarial type It occurs most often in persons who sit on an open verandah reading by the light of a pressure gas lamp on warm tropical nights It seldom occurs to them that the dust from the moths which they brush away as they read is the cause of the irritation which comes on and increases during the night

There are innumerable forms of fly bites and acarid infections The sand flea *Tunga penetrans* is troublesome in certain areas In some instances disease is transmitted by ticks and tsetse flies Atunrase and others [35] note the frequency of infection with sand fleas in parts of Nigeria, almost all the population having suffered from the infection at some time or another The condition is most common in the dry season

Myiasis is a condition in which flies of various species such as *Cordylobia anthropophaga* insert their eggs in the cracks in earthen floors and the larvæ infect the skin of persons lying on the floor As the small maggot *Auchmeromyia luteola* develops there is severe irritation and often secondary infection The grub eventually emerges and the nature of the condition becomes obvious The appearance of these lesions is very like a vaccination inoculation on about the sixth day The fact that the patient has not been vaccinated and the unusual position of the lesion often suggest the nature of the condition If the lesion is examined carefully with a strong magnifying glass the centre can frequently be seen to show movement The irritation can be much reduced by applying vaseline to the skin surface This cuts off the oxygen supply to the larva and so kills it and stops the movement The larva can then usually be expressed gently within

No 2 THE VIPERINÆ are the non pit vipers—found in Africa, Asia and Europe Swivel-front fang snakes, but with no pit between *nostril and eye*

All vipers in Africa are non-pit vipers There are seven genera and about forty species

Causus rhombeatus	Night adder
Causus lichtensteinn	Night adder
Bitis gabonica	Gaboon viper
Bitis arietans	Puff adder
Bitis nasicornis	Rhinocerus viper
Cerastes cornutus	Horned viper
Atheris chlorechis	Green tree viper
Atheris squamiger	Green tree viper
Atheris ceatophorus	Green tree viper
Echis coloratus	The Arabian viper
Echis carinatus	*Carpet viper, Africa, Arabia, India*
Atractaspis microlepidota	The mole or burrowing viper
Atractaspis irregularis	The mole or burrowing viper
Atractaspis bibronii	The mole or burrowing viper
Atractaspis dahomeyensis	The mole or burrowing viper
Atractaspis corpulenta	The mole or burrowing viper
Atractaspis engaddensis	The mole or burrowing viper
Vipera berus	The northern viper, Europe
Vipera montandoni	The Bulgarian viper
Vipera lebetina obtusa	The Levantine viper
Vipera palestinæ	The Palestine viper

2 " The use of hydrocortisone in experimental viper venom poisoning in mice " R D Ganatra *et al* (1957) *Indian J Med Sci* **11**, 493

Experiment carried out on mice to find the effect of hydrocortisone in protecting the animals against a LD_{50} of viper venom

Number of Animals	Venom dose in 20 gm Mouse	Antivenene dose in 20 gm Mouse	*Hydrocortisone dose* in 20 gm Mouse	*Mortality* Percentage
	mg	mg	mg	
15	0 2	Nil	Nil	100
10	Nil	30	Nil	Nil
30	0 2	30	Nil	57
30	0 2	30	2·0	17
30	0 2	Nil	2·0	17

Conclusion —Hydrocortisone is more effective in treatment of viper venom poisoning than antivenine Antivenine and hydrocortisone given together has no advantage over hydrocortisone given alone

3 " Poisonous fish of the South Pacific " A R Mills (1956) *J trop Med Hyg* **59**, 99

[illegible]

(5) Convict tang (*Acanthurus sanvicensis*)
(6) Stone fish (*Synanceja trachynis*)
(7) Eel (*Angulla mauritiana*)
(8) Coral bream—slate bream (*Plectorhinchus sp*)
(9) *Sting ray* (*Trigonidæ*)
(10) Poisonous cone—a shellfish (*Rollus geographus*)

FIXED-FRONT FANG SNAKES with cannula through tooth (Proteroglyphidæ) Cannulated teeth fix and placed in front part of max lla the cobras ringhals mambas coral snakes kra Australian snakes and sea snakes

No 2 THE COBRAS

Naja melanoleuca
Naja n gr coll s
Na a gold
Naja ha e
Naja anomalus
Naja hannah
Naja flava

Black and white cobra
Black necked cobra Sp tt ng
Gold s cobra
Egyptian cobra
King cobra of Malaya
South African cobra

No 3 THE RINGHALS

Hemachatus hæmachates

South African sp tting snake

No 4 THE MAMBAS

Dendraspis jameson i
Dend a p s virid s
Dendra p s an gust ceps
Elapech s guan heri

Tra ll s green mamba
Hallowell s green mamba
The common mamba— black mamba
African garter snake

No 5 THE CORAL SNAKES (genus *M crurus*) Many varieties mostly South and Central America

No 6 THE KRAITS fixed front fang snakes India Ceylon Malaya and South east Asia

Bungaru cand dus
Bungarus fa ciatus
Bungarus ceylonicus
B ngarus flaviceps

The common kra t
The banded kra t
The ringed kra t
The yellow headed kra t

No 7 THE FIXED-FRONT FANG SNAKES of Australia

Denisoma superba
Notech s scuta us
Acanthopis antart cus
Demansia text l s
Pseudech s porphyriacus

The copper headed snake
The tiger snake
The death adder (not an adder)
The brown snake
The black snake

No 8 THE SEA SNAKES (Hydrophidæ) fixed front fang snakes and laterally compressed rudder like tail and a bifid lower jaw Indian Ocean and Pacific Ocean

Hydroph s semperi
Hyd oph s sp ral s
Hydroph s cyanocinctus
Pelamis platurus
Lat cauda colubrina

Sea snake Philippine Islands

Black and yellow sea serpent

CLASS C THE VIPERIDÆ The v per families—P t vipers and non p t vipers

No 1 THE SWIVEL FRONT FANG SNAKES are all grouped under the family Viperidæ D v ded into two groups 1 W th p t present, 2 W thout p t A p t is a hole or depress on s tuated on the s de of the head between eye and nostr l

The Crotal dæ fam ly are the pit vipers with six genera and 100 species American continent and Asia—not in Africa

The V perinæ fam ly are the p tless v pers—seven genera many species

Crotalus	Diamond rattlesnakes of America Twenty species
B throp	Forty species
Lachesis	The bushmaster of Trinidad One species only *L mutus*
Trimeresurus	Oriental p t viper Twenty species
A k trodon	W despread hence many names Twelve species
Sisturus	Prairie snake of North America Three species only

18 MOHAMMED, A H & ZAKI, O (1957) The Walterinnesia toxin as a liberator of histamine from [illegible]
19 [illegible]
20 [illegible]
21 [illegible] in mice *Indian J med Sci* 11, 493
22 SCHOTTLER, W H A (1952) Experimental study on the importance of early antivenin treatment in snake bite *Amer J trop Med Hyg* 1, 1038
23 MINTON, S A (1954) Polyvalent antivenin in the treatment of experimental snake venom poisoning *Amer J trop Med Hyg* 3, 1077
24 MILLS, A R (1956) Poisonous fish in the South Pacific *J trop Med Hyg* 59 99
25 HANEVELD, G T (1956) Injury caused by Garfish like fish. *Docum med geogr trop (Amst)* 8, 96
26 KHLENTZOS, C T (1950) 17 cases of eel poisoning *Amer J trop Med* 30, 785
27 RALLS, R J & HALSTEAD, B W (1955) Moray eel poisoning *Amer J trop Med Hyg* 4, 136
28 ROMEYN, T & HANEVELD, G T (1956) Turtle meat poisoning in Netherlands New Guinea *Docum med geogr trop (Amst)* 8, 380
29 HICKS, A (1957) Coral ulcer *E Afr med J* 34, 121
[illegible] problem [illegible] Brazil *Amer J trop Med Hyg* 1, 508
[illegible] The action of scorpion toxin on blood
[illegible]
[illegible] ntidote to scorpion toxin *J trop Med Hyg* 56, 58
33 LUCEY, J F (1950) Fatal spider bite *E Afr med J* 27, 244
34 O ROURKE, F J (1955) Arthropods and human health *Irish J med Sci* p 78
35 ATUNRASE, J O *et al* (1952) Some observations on Tungiasis in Yorubaland, Western Nigeria *W Afr med J* 1, 181
36 MAEGRAITH, B G (1944) Identification of poisonous snakes in British West Africa *Ann trop Med Parasit* 38, 21 and 119 Part 1 and Part 2

4 Suggested equipment for emergency treatment of venomous poisoning (Snake bite, scorpion stings and spider bites)

Tourniquets	Esmarch type for limbs
	Catheter type for fingers
Dressing materials	Bandages 1 in., 2 in, 3 in wide
	Cotton-wool sterilised in containers
	Gauze swab dressings, sterile in containers
	Scissors, dressing forceps
Containers	Ethyl chloride spray
	Penicillin, 100,000 units
	Antitetanic serum
	Sterile test tubes
	Venules (Bayers)
	Record syringes, 2 × 10 c c
	Record syringes, 2 × 2 c c
Estimators	Eldon blood-grouping cards
	Tallqvist Hb scale book
Infusions	Saline glucose—Intravenous, 1 pint set
	Infusion Peristan N (Bayer), 1 pint set
Ampoules	Benadryl, 2 c c
	Cortisone, 25 and 50 and 100 mg
	Antivenene suitable for local types of snakes
	Antivenene suitable for scorpions (Squibb Ltd)
	Antivenene suitable for " black widow " spider bites
	Calcium gluconate, 10 per cent, 5 c c
	Coramine, 2 c c
	Heparin, 1 c c
	Atropine sulphate, 1 per cent, 1 c c
	Ergotamine tartrate, 1 c c
	Procaine, 2 per cent, 5 c c ampoules
	Morphia sulphate, ¼ gr and ½ gr
	Adrenaline hydrochloride, 1 in 1,000

REFERENCES

1 BUTS, R. O (1957) Human bites *Internat Abstr Surg* 104, 86
2 NIKOLIC, M (1953) Anti tetanic serum in bite wounds *Med Rev Serb med Ass* 6, 426
3 BREEN, G E., LAMB, S G & OTAKI, A T (1958) Monkey bite *Brit med J* 2, 22
4 SWAROOP, S & GRAB, B (1954) Snake bite mortality in the world *Bull Wld Hlth Org* 10, 35
5 LIESKE, H (1957) Poisonous snake bites *Germ med Monthly*, 2, 232
6 CANSDALE, G (1955) *Reptiles of West Africa*, p 13 London Penguin
7 VILLIERS, A (quoted Cansdale) (1950) *Les Serpents de l'ouest Africain* Dakar I F A.N
8 CORKILL, N L., IONIDES, C J P & PITMAN, C R S (1959) Biting and poisoning by the mole vipers of the genus *Atractaspis* *Trans roy Soc trop Med Hyg* 53, 95
9 WOOD, J T (1954) A survey of 200 cases of snake bite in Virginia *Amer J trop Med Hyg* 3, 936
10 Editor (1956) Snake Bite *Cent Afr J Med* 2, 345
11 HAAST, W E. & WINER, M L (1955) Complete and spontaneous recovery from the bite of a blue krait snake *Amer J trop Med Hyg* 4, 1135
12 VOGEL, D (1954) *Reptile life—Action of snake venom*, p 69 London Spring Books
13 REID, H A (1957) Antivenene reaction following accidental sea snake bite *Brit med J* 2, 26
14 REID, H A (1956) Sea snake bite research *Trans roy Soc trop Med Hyg* 50, 517
15 JUTZY, D A, BIBER, S H, ELTON, N W & LOWRY, E C (1953) A clinical and pathological analysis of snake bites on the Panama Canal zone *Amer J trop Med Hyg* 2, 129
16 ARCHAMBAULT, H A (1957) Personal communication on snake bites at Jirapa, Ghana
17 EFRATI, P & REIF, L (1953) Observations on 65 viper bites in Israel *Amer J trop Med Hyg* 2, 1085

Whereas thyroid enlargement is seen in adolescent persons, nodular goitre occurs more frequently in those of an older age group Irregular nodular goitre often follows colloid goitre as involution of the primary condition takes place It is usual to note that a high proportion of patients who come to hospital for treatment are women who carry with them a young child of 6 months to 1 year There is a close relationship between thyroid adenoma formation and child bearing It is likely that the strain of labour during delivery is an important factor contributing to the formation of cyst adenomata in women who already have a hyperæmic or otherwise pathological thyroid gland On a few occasions young educated African women have been operated upon for a small adenoma of the thyroid gland and they have invariably given the history that two or three days after childbirth they felt a painful area about one side of the front of the neck, it was uncomfortable when pressed upon and gradually a small localised mass developed When operating on these cases about five months later it was obvious that there had been a hæmorrhage into the substance of the lateral lobe on one side

Whereas the incidence of thyroid enlargement is relatively high in many parts of the tropics, the incidence of thyrotoxicosis is comparatively low Most of the patients accept an enlarged thyroid as inevitable and do not worry unduly about it unless it increases rather quickly The presence or absence of thyrotoxicosis is usually judged on clinical grounds, considering tremor of the hands, widening of the palpebral fissures, the presence of exophthalmos and a conspicuous degree of nervousness exhibited by the patient on small provocation In the absence of special apparatus for gas analysis it is difficult to assess minor degrees of metabolic disturbance Reid's formula, quoted by Illingworth,[7] is most useful in these circumstances

$$\text{B M R} = 0\ 683\ (\text{pulse-rate} + 9/10\ \text{pulse-pressure}) - 71\ 5$$

This formula is based on the relation between the patient's pulse-pressure and the patient's pulse-rate It can be worked out quite easily at the patient's bedside and has therefore obvious advantages From personal experience of its use, it is considered to be reasonably accurate, corresponding closely to the patient's clinical condition It is helpful in assessing the operative risk in toxic cases The normal basal metabolic rate figure (B M R) is taken to be ten to fifteen In cases of toxicity this figure rises up to between twenty and fifty Toxicity becomes clinically obvious when the figure reaches twenty-five and over Patients with a B M R of between thirty and fifty are considered to be in the high surgical risk class Thyroid adenomata are rather rare in African women who have not had a child Where adenomata occur in juvenile patients there is often a history of the patient having had a severe attack of whooping cough one or two years earlier Thyroid abnormalities are more common in women than in men, the relationship being about seven to one

Considering the relationship between thyroid abnormalities and tropical diseases the following points are mentioned Reidel's thyroiditis is rare—some now deny its existence It has not been noted in African patients, but it has been seen in Indian male patients on one or two occasions In patients showing evidence of

24

Diseases of the Thyroid Gland

GOITRES

DISEASE of a thyroid gland usually gives rise to either physiological disturbances of the body or an anatomical distortion of the structure In some instances both are present There is a close association between all forms of thyroid abnormality and the level of iodine content of the food and fluid ingested. In many areas of the world where thyroid enlargement is seen in a relatively high proportion of the population the water supply is usually from wells In many instances there is contamination of the water by decaying vegetation

In certain countries there is an unusually high incidence of thyroid gland enlargement, Switzerland was well known on this account Saxen[1] reports that Finland suffered in the same respect Guatemala in Central America was found by Munoz, Perez and Scrimshaw[2] to have 38 per cent of the total population affected to some extent with goitre In certain parts of Africa the incidence of endemic goitre is as high as 50 per cent, as noted in the north-eastern region of Sierra Leone by Wilson, Grundy and Eddy[3] In parts of Northern Ghana the incidence is as high as 10 per cent. in the males and 60 per cent in females There is also a very high incidence of goitre in localised areas of the Himalayas in Pakistan (Rius[4])

Goitre is less frequently found in areas close to the sea than in the hinterland at distances exceeding thirty miles O'Donovan,[5] studying goitre areas in Ireland, noted that in almost all districts where there was a high incidence of thyroid enlargement the villages were located on the leeward side of mountain ranges so that the adjacent hills protected them from the prevailing sea breezes The impression was gained that in these places there was a deficiency of iodine possibly occasioned by the absence of iodine carried in minute quantities with the vapour continually blown in from the sea Thyroid enlargement is certainly much more common in most countries inland rather than close to the sea Along the immediate seaboard it is comparatively rare. In Sierra Leone[3] it was noted that the incidence of goitre was highest in areas corresponding to the distribution of pre-Cambrian granite rock formation In these areas there was a deficiency of iodine in the water supplies Along the coast and in western areas the goitre incidence was low

There has been a conspicuous decrease in the goitre rate in Switzerland and Finland with the compulsory introduction of iodine to the commercial salt supplies Carr[6] has recommended the introduction of iodides in the commercial salt supplies in parts of Central Africa where goitre is endemic He considered that potassium iodate was more suitable as an additive to the salt than potassium iodide as the former is more stable at the higher temperature ranges of the tropics than the latter An addition of 1 part in 10,000 is recommended

It is desirable in all cases to have suitable typed donor blood available for transfusion at the time the operation is started

It is difficult in some cases to get suitable blood If suitable blood cannot be obtained from a donor the practice of "delayed autotransfusion" is sometimes very useful One pint of blood is taken from the patient on admission to hospital Acid citrate dextrose solution is used for its storage and as an anticoagulant, as described in Chapter 20 The blood is kept in cold storage for one week, during which time the patient is given high protein diet, intravenous iron, ferrivenin and high vitamin content tablets During these seven days the blood volume is restored by red cell regeneration and hæmodilution from tissue fluids

The operation is then undertaken and the pint of the patient's own blood removed earlier and stored is transfused during the operation in order to compensate for the blood loss during operation, so preventing hypovolæmic shock The patient in this way receives blood at the time it is most needed Before returning the blood a specimen should be removed with a sterile pipette to test it by microscopic examination for possible contamination by organisms during storage A polyvinal blood substitute should be available in the theatre if required when no blood is obtained for transfusion



FIG 246
Large bilateral goitre neglected for many years in a male patient

In many parts of the tropics patients do not like having a general anæsthetic, but they are quite willing to submit to surgery under local anæsthetics In some cases this has marked advantages Whereas an endotracheal general anæsthetic using gas, oxygen and ether is very satisfactory for the surgeon, it is not necessarily the best for the patient Those who have undertaken removal of large thyroids by various methods are convinced that local anæsthesia has many advantages The use of large quantities of weak local anæsthetic, following adequate sedation, is pre-eminently satisfactory Morphia $\frac{1}{4}$ gr and hyoscine $\frac{1}{150}$ gr given fifteen minutes before operation is considered to be most suitable The method takes a little longer than when general anæsthesia is used and it is essential to handle the tissues very gently Procaine $\frac{1}{2}$ per cent is considered best as large quantities can be used, we usually made up 100 c c with $\frac{1}{2}$ c c of 1 in 1,000 solution of adrenaline added Of this about 60 to 80 c c was usually employed The secret of satisfactory local anæsthesia is the use of large quantities of weak solution rather than a small quantity of strong solution Very large quantities of $\frac{1}{2}$ per cent novocain, up to 10 oz, can be used if necessary with impunity Novocain alone is not a toxic substance It can even be given intravenously as a stimulant Caution, however, is needed not to inject into veins inadvertently, because of the adrenaline present

low-grade inflammation about the thyroid gland, there is often a guinea-worm infection present in the tissues of the neck The inflammation is usually unilateral This condition must be considered in areas of the world where dracunculosis is known to exist The patient should be interrogated about the possibility of an earlier guinea-worm infection about the usual place, the lower limbs An X-ray is sometimes helpful in showing old standing infections, where calcified guinea worm is seen in the tissues No cases of tuberculosis of the thyroid gland have been recognised

In certain areas where thyroid enlargement is endemic, schistosomiasis is also prevalent and in view of the possibility of a course of antimony being given for schistosomiasis, it should be pointed out that there is considerable risk in giving antimony to a patient with a toxic thyroid condition It is advisable if thyrotoxicosis is present with schistosomiasis that the patient should have a preliminary course of thiouracil for the thyroid condition before antimony injections are given If thiouracil is not available para-aminosalicylic acid (PAS) has a somewhat similar effect in decreasing the basal metabolic rate and activity of the thyroid gland The B M R can be estimated by Reid's formula before and after the course of thiouracil to assess progress

Many patients seek treatment for an enlarged thyroid gland for cosmetic reasons only They do not feel ill in any way In cases of uniform enlargement of the neck due to colloid changes in young adult patients there is no urgency in undertaking operative treatment In some cases it is contraindicated It is advised that a preliminary course of Lugol's iodine, 10 minims twice a day, should be given for at least one month before reassessing the position If there is evidence of iodism, as indicated by symptoms of sore throat and coryza, the dose must be decreased

The risk of malignant disease in enlarged thyroid glands is low, but it is noted to occur at an earlier age than is usual for malignant disease elsewhere One African patient with a very large thyroid gland was seen where malignant changes occurred, as evidenced by the development of a secondary malignant growth in the upper end of the tibia, the girl was only 17 years of age The incidence of malignant changes in the enlarged thyroid gland is slightly higher in men than in women

THYROID OPERATIONS

Many patients in the tropics come to hospital for operative treatment, having neglected the enlarged thyroid for many years When first seen (Fig 246) there is an enormous swelling on both sides of the neck In some patients, particularly those over 60 years, it is, in some instances, better to leave the condition alone If, however, the patients are adequately prepared, a very large goitre can be dealt with with a surprisingly low operative mortality when local anæsthesia is employed for removal of the mass Preliminary rest in hospital is desirable for at least ten days before operation The patient should be treated for all forms of parasite which he or she may harbour The cases need careful investigation The hæmoglobin level should not be below 80 per cent before operation is undertaken.

unwise before thyroid operations, as in the rare instances where a small amount of general anæsthesia is required, it is difficult to give a good general anæsthetic following barbiturates which depress the respirations considerably

A low transverse cervical incision is in most cases considered suitable for the removal of large thyroid adenomata, this admits of an easy approach to both sides of the gland In most cases several adenomata are present This scar is least likely to cause keloid formation following operation The low scar can be concealed easily during convalescence using a light handkerchief round the neck In some instances where there is a particularly large single mass on one side only an anterior border sternomastoid incision gives excellent access, permitting of adequate visualisation of the superior thyroid vessels which are in these cases very large The incision is, however, liable to hypertrophy and thickening Where the operative risk is high the appearance of the scar is of secondary importance in view of the increased margin of safety afforded Fig 250 shows a young boy who was operated upon through this incision and an enormous tumour removed



Fig 251
Same patient as Fig 250 following removal of mass through anterior sternomastoid incision

In Europe it is generally considered unsound technique to remove an adenoma of the thyroid gland alone, and subtotal thyroidectomy is favoured in cases of any form of thyroid abnormality because of the high risk of recurrence of pathology and the danger of subsequent thyrotoxicosis In the tropics where the rate of thyrotoxicosis is very low indeed there appears to be no good reason to undertake a subtotal thyroidectomy when there is only one well-localised lesion present If there is evidence of multiple nodules widely distributed throughout both sides of the gland, it is obviously wiser to undertake a subtotal thyroidectomy

Tetany is a complication occasionally seen following thyroid operations If the covering areolar tissue is well cleared off the surface of the gland, the parathyroid glands are seldom removed Tetany has been encountered on three occasions only and it is thought that these were due to a congested state of the local tissues rather than to removal of the parathyroid glands In all cases the condition improved without the use of parathormone which was not available The use of intravenous calcium gluconate relieves the carpopetal spasm and the tightness of the masseter muscle It also alleviates the alarm of the patient, who is naturally concerned by this complication over which she has no control

It is an advantage to give calcium by mouth in cases where a large mass of thyroid tissue requires removal In elderly patients who show evidence of

Fig 247 shows a patient before operation with a large adenomatous mass of thyroid tissue present The mass removed is shown in Fig 248, she made a





Fig 247 Fig 248

Fig 247—Female patient with large non toxic adenomatous mass in thyroid gland
Fig 248—Tissue removed under local anæsthesia from the above female patient (Fig 247)

satisfactory recovery (Fig 249) Woodman[8] comments on the advantages of local anæsthesia following pre-operative sedation in patients being operated upon for removal of large thyroid masses He used 1 per cent novocain and 30 c c was





Fig 249 Fig 250

Fig 249—Same patient as in Fig 247 following operation
Fig 250—Child with large unilateral goitre before operation

injected Personally, it has been found better to use larger quantities of weaker solution, ½ per cent novocain, but the employment of 1 per cent solution is very usual and popular The use of barbiturates as a pre-operative sedative is considered

REFERENCES

1 SAXEN, E & SAXEN, L (1954) Mortality from thyroid disease *Docum Med geogr trop. (Amst)* 6, 335

2 MUNOZ, A J, PEREZ, C & SCRIMSHAW, N S (1955) Endemic goitre in Guatemala *Amer J trop Med Hyg* 4, 963

3 WILSON, D C, GRUNDY, H M & EDDY, T P (1954) Goitre in Sierra Leone *Trans roy Soc trop Med Hyg* 48, 481

4 RIUS, A C (1951) Diseases due to nutritional disturbances *Clinical Tropical Medicine*, p 1297 (Gradwohl *et al*) St Louis, U S A Moseby

5 O DONOVAN, D K (1950) The problem of endemic goitre in Ireland *Irish J med Sci* p 161.

6 CARR, W R (1956) Iodised ration salt and goitre *Cent Afr J Med* 2, 91

7 ILLINGWORTH, C F W (1939) *A Short Textbook of Surgery*, 2nd ed London Churchill

8 WOODMAN, H (1952) Endemic goitre in Central Africa *E Afr med J* 29, 217

laryngeal stridor or respiratory embarrassment due to external pressure on the trachea in the neck, it is occasionally necessary to divide the isthmus of the gland by diathermy or actual cautery This gives relief of their symptoms To undertake removal of the main mass would be, in some instances, a procedure which the patient is unfit to stand These patients are usually not concerned about the appearance of their neck, but only the respiratory distress they suffer In younger patients where there is respiratory distress and there is no obvious gross pressure exerted on the trachea in the neck, the condition is invariably due to a retrosternal thyroid adenoma, pressing on the trachea below the level of the suprasternal notch In these patients it is surprising to note the ease with which a relatively large adenoma can be withdrawn from the thoracic cavity with the finger through the suprasternal notch without dividing the sternum On one occasion a spherical mass of 2 in in diameter was withdrawn without undue difficulty By its removal the patient was immediately relieved of respiratory difficulty Immediately following removal of such a mass there is a rush of blood from the cavity, and as it is not possible to see the vessels from which the blood is coming it is wise to have a small abdominal pack ready which can be inserted into the area and be retained for about five minutes before proceeding with the operation

There is no advantage in attempting to retain the continuity of the infrahyoid muscles if they interfere with the ease of removal of a large thyroid mass They should be cut across transversely They can subsequently be repaired without difficulty, being much elongated by previous prolonged stretching The bed of the thyroid gland must be quite free from oozing of blood before the neck layers are closed It is advisable to drain the area, for whereas it is not essential in all cases, it is certainly desirable If drainage is not instituted a large hæmatoma occasionally develops on one side and this necessitates returning the patient to the theatre for the evacuation of the clot This is detrimental to the subsequent appearance of the wound, which must be reopened, and very alarming to the patient The use of a strip of fibrin foam on both sides at the base of the paravertebral gutter is a great advantage It is better to bring the strip of corrugated rubber drainage material through a separate small opening below the main wound rather than through the centre of the primary incision The rubber is divided into two upper leaves united at the base which comes through the drainage wound The rubber is removed twenty-four hours later with the first dressing It is unwise and unnecessary to leave it in for a longer time

Rectal anæsthesia for thyroid operations gives a rather unreliable and light anæsthesia Both rectal oil and ether and Avertin need to be supplemented by local anæsthesia, and under these circumstances it is of little advantage, the patient is neither sufficiently asleep (with the standard doses recommended) to proceed unhampered with the operation, nor sufficiently wakeful to be co-operative These methods are therefore not recommended and are better avoided unless there is a trained anæsthetist present to give supplementary anæsthesia as required

maturity is reached Precocious breast development is sometimes seen in young girls before normal puberty If this is noted the condition suggests the presence of overaction of the ovary, the adrenal gland or the hypothalamic area of the brain Ovarian tumours in young girls are seen occasionally, Fig 31 shows a picture of two girls both aged about 13 years for whom an ovarian tumour was removed in each case They both showed breast development to a greater extent than might have been expected in children of their age The rate and extent of development of the breast is essentially a hereditary characteristic

The contour of the breast also has marked regional and tribal distinctions This is particularly apparent amongst women of the light-coloured nomadic Fullani people of the Northern Territories of West Africa In the majority of male patients there is evidence of fibres of the platysma muscle reaching down as low as the nipple position, the area of its action can easily be seen on tensing the neck on one side In women it usually extends only as far down as the clavicle or a little below In Fullani women, however, there is a very marked development of the platysma muscle fibres which extends right over the breast area to the level of the lower ribs and probably for this reason the slight upright direction of the nipple and absence of sagging of the breast is very conspicuous and characteristic

Stout women suffer more from pendulous breasts than those of lighter build The weight of the breast is no doubt a contributory factor in producing the condition It is greatly aggravated by the presence of chronic low-grade sepsis in the breast tissues following inadequately treated inflammatory conditions Chronic lymph stasis occurs which is not necessarily filarial in origin and this causes an increase in weight of the organ Fig 252 shows a patient with an enormous enlargement of the left breast There was no microfilaria apparent on repeated examination of blood films The condition might be more correctly termed an "elephantoid" breast rather than elephantiasis of the breast The position of old chronically infected sinuses can be seen close to the nipple There was no difficulty in removing this breast, as it necessitated cutting through only two layers of skin with very little fatty tissue between them The breast tissue was pulled down to a much lower level The patient was greatly relieved by removal of this mass Fig 253 shows the patient after operation The photograph is of poor quality having been taken with a plate camera Plate cameras are less suitable for work in the tropics than film cameras due to the heat conditions, which adversely affect the emulsion on glass, films are much better, not being seriously affected by the heat

Very few requests have been received from patients living in the tropics for mammaplasty operations McIndoe's[1] procedure is considered standard A circular incision is made round the skin of the nipple The diameter of the circle is 2 in approximately A large semi circular incision is then made on the front of the breast with the convexity downwards and in such a position that when subsequently sutured in apposition along the site of the submammary line, it will accommodate the reconstructed breast neatly at the raised position To prevent redundancy being present a triangle of skin is excised from the upper flap with the base along the base and the apex touching the edge of the circle representing

25

Diseases of the Breast

NON-MALIGNANT CONDITIONS

IT is difficult to assess with any degree of accuracy the relative frequency of breast pathology for purposes of comparison between indigenous persons in the tropics and those from non-tropical areas. The impression is gained from clinical experience that there is much less breast pathology noted in women in tropical areas than in women from temperate zones. Carcinoma of the male breast is, however, more common in men in the tropics than in male patients in Europe. The greater willingness on the part of most indigenous women in the tropics to *breast feed their children than that noted in women in Europe predisposes to* more adequate breast drainage following childbirth. It is usual for women to breast feed their babies for at least one year and in some cases up to two years. The babies decide when they want to feed and how much they take. The children are carried on the mothers' backs and know where the milk is kept. This seems to be a very natural method convenient to both mother and child. It has no conspicuous disadvantages. The baby is weaned at between 1 and 2 years unless the mother again becomes pregnant. The longer duration of breast feeding is beneficial to the infant in areas of the world where cows' milk is not freely available or used. Abrupt weaning of an infant at an early age predisposes to infantile malnutrition.

In most parts of the world the birth-rate is in inverse proportion to the educational standard of the people. In underdeveloped parts of the world, where the general educational and economic standards are low, women accept large families willingly. Breast feeding of infants certainly does not seem to predispose to breast pathology but rather the reverse, certainly as regards malignant disease.

About 20 per cent of all infants at birth show a degree of infantile lactation or secretion in the breast tissue during the first week of life. This effect upon the child is due essentially to the natural balance of hormones which develops in the mother in preparation for breast feeding the infant. The condition disappears without treatment within one week. It is unwise to express milk from the infant's breast.

Supernumerary nipples are more common in patients in the tropics than in persons of non-tropical areas, but they are less conspicuous because of the dark complexion. Only on rare occasions is breast tissue associated with them, and if so it occurs usually in the first nipple below the normal one. Requests for their removal are rare.

Adolescent breast development starts in most female children at the age of 12 years. It becomes quite obvious at the age of 13 and increases thereafter till

condition has become quiescent the baby can again be allowed to feed from the breast as the risk to the infant is remote Breast feeding relieves the breast of milk most adequately

A glass breast-milk evacuator is a suitable piece of apparatus to use for the relief of milk congestion if the infant is not feeding from the affected side An evacuator, being made of glass, breaks very easily and cannot be replaced quickly in country stations In these circumstances a clean new tobacco pipe, which in most instances can be purchased locally, can be used as it makes an excellent breast-milk evacuator The bowl of the pipe fits comfortably over the nipple Suction can be applied by attaching a rubber tube and evacuator bulb to the stem of the pipe If no bulb is available a wide-mouthed bottle fitted with a two-holed rubber stopper and angled glass tubes can be used The stem of the pipe is attached by a rubber tube to one glass stem and to the other a second rubber tube is joined to which mouth suction is applied In this way milk can be withdrawn from the breast into the bottle The patient can apply the suction herself gently so that milk is withdrawn at a rate which causes the minimum discomfort

The inflammatory condition of gangrene of the skin of the breast has already been referred to in Chapter 10 The analogy between this form of gangrene and gangrene of the skin of the scrotum in the male has been indicated This unusual breast condition (Fig 89) is caused by a woman with an infected breast, where the deep veins are thrombosed, lying on the breast when sleeping in the ventral position In this position drainage by the superficial veins is mechanically obstructed by angulation at the site of greatest circumference of the breast The condition has been seen on a few occasions A large area of skin sloughs but a small amount remains viable adjacent to the nipple After the necrotic tissue comes away the denuded surface heals quite quickly by granulation and epithelialisation

Tuberculous mastitis is now very rare in Europe This is because of the improved control of milk supplies and the decrease in the prevalence of bovine tuberculosis Breast tuberculosis is usually of bovine origin In spite of the relatively high rate of pulmonary tuberculosis in the tropics the incidence of breast tuberculosis is low Patients with tuberculous mastitis almost invariably have indications of a tuberculous pulmonary infection Several lacteal fistulæ appear in a patient with a low-grade mastitis who is suffering from a hectic fever The true nature of the condition is usually suspected where it does not improve following the use of sulpha drugs and antibiotic preparations On microscopic examination of granulation tissue from the fistulous area tubercle bacilli can in most cases be detected Prior to the introduction of streptomycin, mastectomy was advised in these cases, but the use of a general anæsthetic in a patient already suffering from a pulmonary infection makes this most undesirable With the use of streptomycin supplemented by para-aminosalicylic acid (PAS) the outlook is now greatly improved and treatment along conservative and non operative lines is indicated, certainly at the early stage In most cases the milk fistulæ close quite quickly The treatment of the pulmonary condition is of paramount importance The inadvisability of a patient suffering from this condition having any more children should be indicated to her

the position of the reset nipple The two edges are approximated The ultimate suture lines are therefore seen as a semilunar submammary scar and one vertical

excision of the supramedial third of the breast tissue is carried out with the diathermy knife The ducts about the nipple are avoided by joining the incisions in the breast tissue in an encircling manner about 1 in away from the nipple The edges of the residual two thirds of the breast are drawn together by catgut



FIG 252



FIG 253

Fig 252—Pendulous breast of elephantoid type due to chronic sepsis in the tissues

Fig 253—Same patient as in Fig 252 following operation

sutures and the area drained to decrease the risk of post-operative hæmatoma formation which is the most serious risk of the procedure

In cases of puerperal breast abscess the infection should initially be controlled by the use of antibiotic drugs, penicillin is in most cases suitable The pus is then drained through a 1 in incision radially disposed in the most dependent position of the swelling Through this incision the loculi of the abscess can be broken down and packing is inserted during the next forty-eight hours only, unless the abscess is very large when it may be required for a somewhat longer time In this way adequate drainage is ensured with the minimum of damage to the lacteal ducts Milk fistulæ are very rare following drainage of breast abscesses It is an advantage in inflammatory conditions to give adequate support to the breast, this relieves pain considerably and assists drainage Abscess formation in axillary glands following breast abscess formation is exceptionally rare The breast milk should be evacuated with a breast milk evacuator at an early stage, as it is painful for the mother to feed the baby from the infected breast After the breast

of the prostate and who are given œstrogens to retard the rate of growth sometimes develop a degree of gynæcomasty if the drug is used over a prolonged time Breast enlargement is also noted in non pregnant female patients who take œstrogens by mouth with a view to increasing their chances of becoming pregnant Mild gynæcomasty is occasionally seen in adolescent boys between the ages of 13 and 15, but this state adjusts itself after a few years without treatment in most cases In view of the likelihood of spontaneous adjustment, the minimum of emphasis should be laid on the condition in such patients, so that they do not become very self-conscious of this temporary abnormality An examination should, however, be made to exclude the possibility of tumour formation associated with any of the endocrine-forming glands lest the breast condition should be the outward evidence of more serious pathology manifesting itself by this exhibition of hormone activity In some cases it follows atrophy of the testicles after mumps infections

Koang and others[4] note the tendency for certain drugs to produce gynæcomasty Isonicotinic hydrazide (also termed isoniazid and INH) and digitalis have been named in this respect as well as synthetic œstrogens Isoniazid is used freely in cases of tuberculosis in both male and female patients Patients taking INH are found to have an increased excretion of œstrogen in the urine Many cases of gynæcomasty were noted in undernourished men following release from prisoner of war camps in the Far East The condition occurred when the patients returned to improved diet and an increase of vitamin B content in the food after a period of prolonged nutritional deprivation This was thought to have been the factor responsible for this abnormality of the breast Vitamin B_2 has some features in common with isoniazid and the mechanism of gynæcomasty associated with both these substances is probably the same

The beneficial effect of œstrogens in the treatment of interstitial mastitis is quite apparent In female patients with this condition there is an involutionary state of the breast associated with fibrosis and nodulation becomes apparent The condition is usually generalised, though the irregularities are often more marked on one side than the other The exact cause of interstitial mastitis is not known Its importance and seriousness lies largely in the fact that errors in diagnosis between it and early carcinoma may be made to the detriment of the patient The use of œstrogens causes rapid improvement in the case of interstitial mastitis If the improvement is quite obvious and maintained over one month the diagnosis of interstitial mastitis may be considered established, if, however, a nodular area is still palpable after thirty days' treatment the condition should be treated as a carcinoma A biopsy examination is certainly justified in such cases and most desirable In some cases carcinoma exists in addition to interstitial mastitis and this is a serious pitfall If any doubt exists early surgical treatment should be instituted along radical lines Enlargement of the breast associated with pregnancy is bilateral and symmetrical and it is associated with other evidence of pregnancy The presence of breast secretion in patients who complain of abnormal uterine bleeding is strongly suggestive of a pregnancy being the underlying cause of the breast enlargement

No cases of breast actinomycosis or nocardiasis have personally been recognised but both have been described No records either have been seen of histoplasmosis of the breast

In some cases in the tropics confusion is caused by the presence of a guinea worm cyst in the deep tissues of the pectoral area A male patient is seen here (Fig 254) who suffered from guinea worm in the left leg two years earlier and subsequently developed a large swelling in the right subpectoral position He was sent to hospital with a diagnosis of carcinoma of the male breast but the swelling being of a cystic nature was aspirated with a No 14 S W G needle and 1 pint of



Fig 254



Fig 255

Fig 254—Subpectoral guinea worm cyst simulating breast condition in male patient
Fig 255—Gynæcomasty in a male leper patient

pus removed It contained fragments of guinea worm in it The pus was sterile Four days later the complete cyst was dissected-out unruptured without undue difficulty The patient made an uneventful recovery

Gynæcomasty is much more common in male patients in the tropics than in Europe Many cases have been seen, most of them having been noted in lepers (Fig 255), who seem particularly prone to the condition Another leper patient with gynæcomasty is illustrated in Chapter 10 (Fig 92) Weir [2] noted many patients with gynæcomasty *in the Cameroons, West Africa, and operated on five* cases in one year Certain tribes are much more predisposed to gynæcomasty than others Shirkor [3] noted a high proportion of cases of this condition in the male Africans of the Achawa tribe of Nyasaland He considered that the condition had an obvious hereditary tendency

There is a marked tendency towards gynæcomasty where there is malnutrition associated with the presence of liver dysfunction Patients who have carcinoma

Patients seldom come to hospital sufficiently early to warrant local mastectomy alone It is advisable in almost all cases to undertake a radical type of operation If the patient's hæmoglobin level cannot be brought up to 80 per cent quickly by high protein diet, large amounts of iron by mouth or intravenously and folic acid and vitamin tonics by mouth and a preliminary blood transfusion should be given In patients with large breasts the blood loss during operation can be very high if particular care is not taken to prevent this It is considered advisable in *all cases*, not only in some cases, to give a blood transfusion during mastectomy operations and if this is not done the mortality rate will be much higher If the blood volume is much depleted, and this is not recognised, the patient leaves the





FIG 256 FIG 257

FIG 256—Carcinoma of the male breast in an African patient
FIG 257—Medullary carcinoma of the female breast in a patient aged 42 years

theatre apparently in a reasonably good condition, but about twelve hours later there is rapid deterioration in her state and the patient is lost unexpectedly without any further obvious loss of blood This can be forestalled by blood transfusion during or immediately after the operation

It is also a great advantage when undertaking a mastectomy to make up about 300 c c of ½ per cent novocain solution and add to the total amount 10 minims of adrenaline 1 in 1,000 After the lines of the incisions have been carefully planned the subcutaneous and deep tissues are infiltrated with the solution prepared It is helpful in decreasing blood loss in these cases to tilt the patient into the slightly raised position, with the feet somewhat below the level of the chest and head This causes some pooling of the blood in the lower limbs and so reduces the bleeding at the operation site This position is suitable if the systolic blood pressure is reasonably maintained After the breast is removed and the hæmorrhage is adequately controlled the table is levelled or, if necessary, tilted to a mild Trendelenburg angle The axillary area should be drained for forty eight hours following removal of the breast

MALIGNANT DISEASE OF THE BREAST

Carcinoma of the female breast is certainly less common in West African women than in women of Europe. Doctors working in other parts of the tropical world have gained the same impression. As opposed to this, however, carcinoma of the male breast is much more common in men of West Africa than in European men. Edington[5] confirms this opinion from studies in pathology over several years, the ætiological factors in its production being principally a previous state of gynæcomasty which is not unusual in cases of malnutrition and cirrhosis of the liver. This patient (Fig. 256) illustrates the characteristic appearance of carcinoma of the male breast.

Carcinoma of the female breast is exhibited as four principal types. Taking them in order according to their anatomical situation—from the nipple to the periphery of the organ—though not necessarily in order of frequency of occurrence, they are:

1. Paget's disease of the nipple, with hyperplasia of duct epithelium in the milk channels of the nipple and early invasive malignant changes locally.
2. Deep duct carcinoma in the substance of the breast with obstructive secondary changes causing proximal congestion in the segment of breast implicated.
3. True medullary carcinoma in the parenchyma of the gland with well-localised tumour formation, most common in women between the ages of 30 and 40 years.
4. Scirrhous carcinoma occurring in elderly women where fibrotic changes are retarding the rate of spread of the malignant process. The rate of growth is relatively slow.

The prognosis is poor if carcinoma of the breast occurs in a young woman during pregnancy. If the growth is of the medullary type occurring in a non pregnant woman (Fig. 257) the outlook is good only if the disease is operated upon while it is still localised to the confines of the breast itself and is not fixed in any way to extramammary structures, so permitting of free movement of the breast in all directions on the structures of the chest wall. If there is evidence of local fixity or palpably enlarged glands in the axilla the outlook is not good and a guarded prognosis must be given. In elderly women with scirrhous carcinoma of the breast the outlook following surgery is more favourable.

The surgery of carcinoma of the breast differs little in the tropics from that seen in Europe, but patients in the tropics require very careful handling in view of their relatively poor nutritional state in many instances. The presence of tropical diseases associated with heavy parasitism of various sorts is associated with a hæmoglobin level of between fifty and sixty five only in most cases. Adequate preliminary preparation of the patient is, therefore, essential for the improvement of the general health before surgery can be considered. As, however, the malignant condition necessitates early intervention, it is considered that once the condition is diagnosed not more than three weeks should be allowed to elapse before surgery is undertaken.

are oophorectomy, adrenalectomy and hypophysectomy Only the first is usually within the scope and capabilities of a doctor working alone in a country station, *but in these cases removal of the ovaries has a very advantageous retarding effect* on possible metastatic malignant deposits and should be considered In cases where the prognosis is known to be poor most patients are willing to submit to oophorectomy Whether this is undertaken at the time of the initial operation or one month later is a matter of judgment and is dependent on the patient's condition at the time of completion of the initial operation Testosterone given by mouth is useful but less beneficial than oophorectomy There are yet few centres in the tropical world where X-radiation is available for treatment of malignant disease and so cases of carcinoma of the breast cannot have the surgical treatment supplemented by this means following operation

Carcinoma of the male breast should be treated by radical mastectomy and at the time the patient presents for examination and treatment the condition has in many cases already implicated the axillary lymphatic glands

REFERENCES

1 McINDOE, A (1957 58) Mammaplasty indications, technique and complications *Brit J plast Surg* 10, 307
2 WEIR H C (1934) A note on gynæcomasty *W Afr med J* 7, 123
3 SHIRKOR, J O (1952) Gynæcomasty among Africans *E Afr med J* 29, 236
4 KOANG, N K, HOU, T K & TCH'EN, K.-L (1955) Gynæcomasty during administration of INH for pulmonary tuberculosis *Chin med J* 73, 214
5 EDINGTON, G M (1956) Malignant disease in the Gold Coast *Brit J Cancer*, 10 595

It has been observed personally that in cases where it is necessary to remove a large amount of skin in order to eradicate the diseased area much shock is caused if the wound is closed under tension Incisions should be planned so that the maximum amount of healthy tissue is conserved consistent with eradication of the growth, this assists in closing the operative field If, however, it is obvious that the wound cannot be closed without tension the central exposed area should be covered with a skin graft taken from the leg If this is likely to be required, the leg should be prepared in anticipation before the operation is undertaken Fortunately the skin about the female breast has little tendency to keloid formation



Fig 258

Advanced carcinoma of the breast in an African woman Note skin involvement

and the scars following breast operations are in most cases quite flat and show little evidence of hypertrophy

Patients are frequently seen (Fig 258) where the growth is at an advanced stage and obviously beyond the time at which it can be removed with any certainty of success It is, however, justifiable in these cases to undertake a radical mastectomy, not because it will cure the patient, but because it removes the local tumour which is bound in time to ulcerate and break down if untreated Such terminal growths ultimately give rise to offensive ulceration and hæmorrhagic discharges which are distressing to the patient and most offensive to the relatives It is, therefore, justifiable in these cases to undertake a radical mastectomy and close the residual uncovered skin area with a skin graft

The treatment should be supplemented by one of three further surgical procedures calculated to alter the hormone balance with a view to retarding the rate of secondary deposits The three possible supplementary operations suggested

are oophorectomy, adrenalectomy and hypophysectomy Only the first is usually within the scope and capabilities of a doctor working alone in a country station, but in these cases removal of the ovaries has a very advantageous retarding effect on possible metastatic malignant deposits and should be considered In cases where the prognosis is known to be poor most patients are willing to submit to oophorectomy Whether this is undertaken at the time of the initial operation or one month later is a matter of judgment and is dependent on the patient's condition at the time of completion of the initial operation Testosterone given by mouth is useful but less beneficial than oophorectomy There are yet few centres in the tropical world where X-radiation is available for treatment of malignant disease and so cases of carcinoma of the breast cannot have the surgical treatment supplemented by this means following operation

Carcinoma of the male breast should be treated by radical mastectomy and at the time the patient presents for examination and treatment the condition has in many cases already implicated the axillary lymphatic glands

REFERENCES

1 McINDOE, A (1957 58) Mammaplasty indications, technique and complications *Brit J plast Surg* 10, 307
2 WEIR, H C (1934) A note on gynæcomasty *W Afr med J* 7, 123
3 SHIRKOR, J O (1952) Gynæcomasty among Africans *E Afr med J* 29 236
4 KOANG, N K, HOU, T K & TCHEN, K-L (1955) Gynæcomasty during administration of INH for pulmonary tuberculosis *Chin med J* 73 214
5 EDINGTON, G M (1956) Malignant disease in the Gold Coast *Brit J Cancer*, 10, 595

26

Tumours, Benign and Malignant

BENIGN TUMOURS

BENIGN and malignant, as applied to tumour formation, is orthodox terminology, but the names are old-fashioned and are not based on a good pathological conception of their nature New growths of all sorts are the result of a combination of a number of factors which ultimately predispose to disturbance of cell growth They are manifested by an increased activity of tissue in a local area initially In growth formation the normal confines of fixed tissues are exceeded The fact that tumours start at a fixed site is strongly suggestive of a locally acting agent being causative in their production Trauma produces local damage and in some instances skin cells are displaced causing inclusion dermoids beneath the skin surface and a hard local mass which grows slowly

Injury also is contributory in cyst formation where damage by scar tissue obstructs secretory ducts, giving rise to retention cysts of the sebaceous type In other instances the precipitating agent is of an infective nature, arriving at the site of the tumour formation either by direct contact from without or through the blood stream from a remote part of the body All infection ultimately enters the body through the surface whether this be the body integument or the intestinal or respiratory tracts Only if there is a soluble absorbable product elaborated by the tumour or secondary to superimposed infection are constitutional disturbances produced Secondary effects are in some instances caused by mechanical pressure exerted on neighbouring structures interfering either with anatomical or physiological function, this is partly due to fibrin elaborated by the tumour itself

Considering the various wide categories of infections, it is noted that examples of tumour formation are exhibited as a direct result of certain diseases in each of these groups

A Metazoal	Schistosoma, skin polypi
B Protozoal	*Entamœba histolytica*, amœbic tumour of uterine cervix
	Leishmania, "Bay sore" of the ear (Guatemala, Honduras) Garnham and Lewis [1] and Cambay sore of the ear in India
C. Fungomycotic	Paracoccidiodosis, Jorg Lobo's disease (Fig 187)
	Blastomycosis, mossy foot
	Histoplasmosis, reticulo-endothelial tumours of infective type
	Rhinosporidiosis, seen as nasopolypoid growths in southern Asia

D Spirochætal	*Treponema pertenue*, causing subperiosteal bone excess deposits "Goundou" is a bony deposition about the nasomaxillary area giving rise to bilateral symmetrical bone tumour formation Fig 259 this is the X-ray picture of patient in Fig 17
E Bacterial	Leprosy, nodule formation of ears and superciliary areas Tubercle bacilli, tuberculoma formation in internal organs Rhinoscleroma, nasopharyngeal granulations by *Bacillus von Fritsch*
F Rickettsial	*Bartonella bacilliformis*, causing warts of the type verruga peruana of South America Infective warts following Oroya fever The placing of bartonellosis in rickettsiosis is somewhat in question
G Viruses	Condyloma acuminata, warts about anogenital areas Also infective warts about the hands of children which assume almost epidemic proportions in certain schools

Such a list of conditions is sufficient to indicate the necessity of a careful microscopic search of suitably prepared tissue being made to establish the nature of the causative agent where possible in cases of tumour formation The local mass may well be only a single manifestation of a more generalised disease If an infective agent can be identified on microscopic examination by its characteristic appearance, many doctors then cease to class the pathological mass as a "tumour" In other words, the term "tumour" is reserved for hypertrophic tissue, the causative agent for which has not been found With improved knowledge and technique in pathology the range of tumour formation in which the causative agent is not identified is becoming narrowed to quite a small number of conditions The use of the electric microscope has recently brought many virus conditions into the scope of visibility and photographs of these "ultra-microscopic" infective agents are now available The virus of poliomyelitis in appearance is very like a mass of mimosa blossoms A method of electric ultrasonic sounding is now being developed for the detection of deep seated tumours

Many infective agents require very precise physical and biological conditions before they can become established in a human host A number of persons working *under apparently comparable* conditions who are contaminated by virus infections do not all necessarily become infected In the case of some infective conditions giving rise to tumour formation the infective agent can be demonstrated only in the early stage of the infection and even then only with some difficulty Such is the case with the Bay sore variety of leishmaniasis as seen in Yucatan, Guatemala and Honduras [1] This chronic ulcerative condition causes a characteristic thickening and subsequent destruction about the ear of patients, it is of a very chronic nature and remains active for up to thirty years It has many features simulating rodent ulcer, a basal cell malignant tumour which seldom forms secondary growths The causative organism of Bay sore is now known to be of the Leishmania variety The characteristic organisms were demonstrated only with difficulty and then in

26

Tumours, Benign and Malignant

BENIGN TUMOURS

BENIGN and malignant, as applied to tumour formation, is orthodox terminology, but the names are old-fashioned and are not based on a good pathological conception of their nature New growths of all sorts are the result of a combination of a number of factors which ultimately predispose to disturbance of cell growth They are manifested by an increased activity of tissue in a local area initially In growth formation the normal confines of fixed tissues are exceeded The fact that tumours start at a fixed site is strongly suggestive of a locally acting agent being causative in their production Trauma produces local damage and in some instances skin cells are displaced causing inclusion dermoids beneath the skin surface and a hard local mass which grows slowly

Injury also is contributory in cyst formation where damage by scar tissue obstructs secretory ducts, giving rise to retention cysts of the sebaceous type In other instances the precipitating agent is of an infective nature, arriving at the site of the tumour formation either by direct contact from without or through the blood stream from a remote part of the body All infection ultimately enters the body through the surface whether this be the body integument or the intestinal or respiratory tracts Only if there is a soluble absorbable product elaborated by the tumour or secondary to superimposed infection are constitutional disturbances produced Secondary effects are in some instances caused by mechanical pressure exerted on neighbouring structures interfering either with anatomical or physiological function, this is partly due to fibrin elaborated by the tumour itself

Considering the various wide categories of infections, it is noted that examples of tumour formation are exhibited as a direct result of certain diseases in each of these groups

A Metazoal	Schistosoma, skin polypi
B Protozoal	*Entamœba histolytica*, amœbic tumour of uterine cervix
	Leishmania, " Bay sore " of the ear (Guatemala, Honduras) Garnham and Lewis [1] and Cambay sore of the ear in India
C Fungomycotic	Paracoccidiodosis, Jorg Lobo's disease (Fig 187)
	Blastomycosis, mossy foot
	Histoplasmosis, reticulo-endothelial tumours of infective type
	Rhinosporidiosis, seen as nasopolypoid growths in southern Asia

tissue is sometimes removed in the belief that some form of skin tumour is present

Tubercle bacilli sometimes give rise to localised tumour formation, but this is noted most frequently in deep tissues and is termed a " tuberculoma "

Rhinoscleroma, if not appreciated, can easily be mistaken in its early stages for benign tumour formation The condition, though most frequently seen in South east Asia, has since 1950 been described from North,[5] South,[6] East, West[8] and Central Africa[9] and should be considered in cases of intranasal and pharyngeal ulceration A small number of cases have been personally encountered in West Africa

The condition of South American warts has been traced to an infection by *Bartonella bacilliforms* and is usually classed with the Rickettsia group of diseases if not with those of bacterial origin This condition of verruga peruana is a warty state which comes on some weeks after an attack of Oroya fever The infective nature of many warts is apparent by the manner in which they spread from place to place, particularly about the hands of children Although the children bite these warts, they seldom become infected about the mouth or lips, apparently the local conditions within the mouth are not suitable for the continued existence of such warts A type of wart more frequently seen in the tropics than in temperate areas is condyloma acuminatum which affects the anogenital areas It is now believed to be due to a virus infection Dispute still exists as to the true nature of many forms of pathology in which there is enlargement of localised tissue in the body such as is seen in cases of Hodgkin's disease Whether it is due to a virus which becomes established under certain conditions is as yet a matter of dispute

A certain number of pathological conditions associated with tumour formation, but for which no known infective agent is responsible, can be transmitted to laboratory animals under certain conditions There is strong presumptive evidence to suggest that both benign and malignant growths are infective in nature Only with some difficulty and under special conditions can the inclusion bodies associated with the virus diseases be recognised in tissue cells Where the causative agent is one of the higher biological forms the real nature of the disease can be determined more easily The general principle is acknowledged that, following surgical removal, all forms of tumour tissue should be microscopically examined to see if a causative factor can be determined Some varieties of deep seated benign tumours have already been considered with abdominal surgery, such as pelvic growths in women

Many small epithelial tumours remain well localised at a fixed site and show no tendency to spread into the deeper layers of the body They do not form secondary deposits in the regional lymphatics These growths termed benign are best removed completely by surgical excision If small growths are very superficial they may be effectively removed by diathermy coagulation, but if following one diathermy application the growth is not eradicated and there is a rapid recrudescence of the growth close to the site at which the diathermy was applied, as sometimes happens, complete excision should then be used It is considered unwise to diathermy pigmented growths because of their tendency to become malignant Excision in such cases is advisable

Cyst formation is usually classed under the heading of benign tumours

recent lesions only The condition is seen most frequently about the face, the outer edge of the ear being affected in many instances It was considered that the ear, having a slightly lower temperature than other parts of the body, may perhaps predispose to this area often being the site of the lesion Maegraith has pointed out the occurrence of Cambay sore of India being of the same leishmanial nature, it also commonly affects the ear area

The characteristic location of many diseases is well known Schistosomiasis although most frequently associated with the urinary tract and intestinal canal can also be demonstrated in many other areas of the body Skin polypi are sometimes caused by schistosomiasis as noted by Nagatey, Moawad and Salem [2] Several forms of helminthic infection give rise to tumour formation This is seen in the various forms of hydatid cysts associated with tapeworm infections of various sorts *Dracunculus medinensis* causes cystic tumours in the deep tissues Clinically they simulate lipomata very closely and are often mistaken for them, because of this possibility in the tropics, it is advisable to put a large exploring needle into any tumour which looks like a lipoma to see if it contains pus, as do guinea-worm cysts The importance of identifying *Entamœba histolytica* in cases of tumour formation of the uterine cervix has been pointed out by Heilbrunn [3] This protozoal parasite should be looked for in such cases, as it causes a form of ulcerating tumour which is easily confused with carcinoma of the cervix This condition has already been discussed elsewhere



FIG 259
X ray photograph of skull in Goundou case showing excess bone at nasomaxillary site

The frequency with which the fungoid diseases give rise to tumour formation has already been indicated, but these diseases are seldom looked for microscopically Birsner and Smart [4] note the occurrence of bone infection with coccidioidomycosis The manner in which *Treponema pertenue* of yaws causes bone thickening associated with periosteal changes is well known The bone tumour formation about the nasomaxillary area is thought to be due to spirochætal infection in early life In some of these cases it is not possible to prove the nature of the condition There is an excess of bone laid down (Fig 259) adjacent to the bridge of the nose as seen in X rays With improved methods in the treatment of yaws, this condition is now less frequently seen in the tropics than formerly

The characteristic enlargement of the tissues about the skin of the superciliary areas and about the lobes of the ears, as seen in leprosy cases, is sufficiently characteristic and obvious to those familiar with tropical diseases to suggest the diagnosis of the condition If skin nodulation occurs in a less characteristic site

tissue is sometimes removed in the belief that some form of skin tumour is present

Tubercle bacilli sometimes give rise to localised tumour formation, but this is noted most frequently in deep tissues and is termed a "tuberculoma"

Rhinoscleroma, if not appreciated, can easily be mistaken in its early stages for benign tumour formation The condition, though most frequently seen in South-east Asia, has since 1950 been described from North,[5] South,[6] East,[7] West[8] and Central Africa[9] and should be considered in cases of intranasal and pharyngeal ulceration A small number of cases have been personally encountered in West Africa

The condition of South American warts has been traced to an infection by *Bartonella bacilliformis* and is usually classed with the Rickettsia group of diseases if not with those of bacterial origin This condition of verruga peruana is a warty state which comes on some weeks after an attack of Oroya fever The infective nature of many warts is apparent by the manner in which they spread from place to place, particularly about the hands of children Although the children bite these warts, they seldom become infected about the mouth or lips, apparently the local conditions within the mouth are not suitable for the continued existence of such warts A type of wart more frequently seen in the tropics than in temperate areas is condyloma acuminatum which affects the anogenital areas It is now believed to be due to a virus infection Dispute still exists as to the true nature of many forms of pathology in which there is enlargement of localised tissue in the body such as is seen in cases of Hodgkin's disease Whether it is due to a virus which becomes established under certain conditions is as yet a matter of dispute

A certain number of pathological conditions associated with tumour formation, but for which no known infective agent is responsible, can be transmitted to [illegible] There is strong presumptive evidence [illegible] e Only [illegible] n bodies associated with the virus diseases be recognised in tissue cells Where the causative agent is one of the higher biological forms the real nature of the disease can be determined more easily The general principle is acknowledged that, following surgical removal, all forms of tumour tissue should be microscopically examined to see if a causative factor can be determined Some varieties of deep-seated benign tumours have already been considered with abdominal surgery, such as pelvic growths in women

Many small epithelial tumours remain well localised at a fixed site and show no tendency to spread into the deeper layers of the body They do not form secondary deposits in the regional lymphatics These growths termed benign are best removed completely by surgical excision If small growths are very superficial they may be effectively removed by diathermy coagulation, but if following one diathermy application the growth is not eradicated and there is a rapid recrudescence of the growth close to the site at which the diathermy was applied, as sometimes happens, complete excision should then be used It is considered unwise to diathermy pigmented growths because of their tendency to become malignant Excision in such cases is advisable

Cyst formation is usually classed under the heading of benign tumours

Sebaceous cysts about the scalp can be dissected out completely unruptured The method of bisecting the cyst initially, removing the sebaceous material and then dissecting out the halves of the sac is advocated by some, but complete excision is preferred by others, so long as the sac wall is removed completely either method suffices to effect a cure If a sebaceous cyst occurs about the face removal by dissection causes a fairly obvious scar in most cases The method of evacuation of the cyst by making a new entry into the cyst to replace the obstructed duct, as advocated by Danna,[10] gives very satisfactory results By this method the sebaceous material is expressed through the new opening made by diathermy puncture of the cyst and the cavity then contracts down within the next week to ten days The new duct must be kept open by the insertion of an oiled probe twice a week while the cavity is contracting down Finally there is a small punctate opening which gives a much better cosmetic result than where an incision is used It is also useful in infected cases permitting of permanent drainage Women appreciate this improved technique for cosmetic reasons The method of diathermy evacuation of Bartholin cysts and abscesses also gives much better and quicker results than where open excision is resorted to

Two tumour conditions seen very commonly in children in the tropics are hæmangiomata and congenital cystic hygroma of the neck The distribution of hæmangiomata has been noted by Chikiamco [11] to be as follows

	Per cent		Per cent
1 Face	56	5 Lower extremities	6
2 Trunk	14	6 Neck	5
3 Upper extremities	9	7 External genitalia	2
4 Scalp	8		

These figures are very close to the relative incidence of the condition in various parts of the body as seen in African children In most cases there is a smooth, almost purple-coloured area of irregular shape about the face, mostly close to the eye or the zygomatic area on one side In a few instances it is seen about the mouth and inside the cheeks as well as on the gums Cases involving the inside of the mouth are much more difficult to treat because of the element of infection present These congenital abnormalities enlarge alarmingly between the second and the sixth month After this they grow much less actively They can be effectively treated by applications of small doses of radium, but in the absence of such facilities in the tropics excellent results can be achieved by the use of various sclerosing solutions, the following are suggested and have all been tried by myself

Hypertonic saline, NaCl 20 per cent solution results very good
Quinine and urethane 20 per cent stronger solutions liable to cause necrosis
Sodium morrhuate is considered less satisfactory than either of the others above
Boiling water difficult to work with and may spill and cause scalds Not advised

Injection with hypertonic saline is very good, but if cases are treated in small numbers only, it is inconvenient having the solution made up freshly when they

come for treatment It is more convenient to use quinine and urethane from ampoules, which ensures the sterility of the solution and saves delay in having hypertonic saline prepared The results with quinine and urethane are equal to, if not better than, those where hypertonic saline is used The quinine and urethane should be diluted to 1/5 or 1/3 strength The full strength is liable to cause surface necrosis following the injection If the angioma is injected from the side through normal skin, bleeding from the injection puncture is less marked than if the needle enters the *angioma directly* The angiomata can be injected at two or three different areas, 2 to 3 minims at each site, depending on its size There are usually several small angiomata present on the same patient A temporary dressing should be placed over the injection area It is advisable to give the child a short general anæsthetic for the injections, for if this is not done the mother is upset, feeling that her child is suffering unnecessary pain, and when this happens she is likely to decline further treatment It is usually necessary to treat the child by injection on three or four occasions at intervals of two weeks to eradicate the angioma completely Cavernous angiomata are much less common than those involving the layers of the skin, the skin over them is not discoloured The vessels in them can be emptied by pressure and they refill slowly when the pressure is removed They are best treated by *ligature and excision of the large vessels* involved They do not thrombose easily with sclerosing solutions (Fig 261)



Fig 260
Capillary hæmangioma on face of African child

Congenital cystic hygroma is a condition very commonly seen in infants in the tropics The condition is usually noted, not immediately the child is born, but the next day, as it increases considerably during the first twenty-four hours of life Most of the children with this abnormality are brought to hospital for treatment at the age of 3 weeks This is a troublesome and dangerous tumour There is a smooth swelling over one side of the neck at the anterolateral aspect, it seldom crosses the middle line, but extends in some instances from the clavicle to the ear (Fig 262) The advice given in many of the surgical textbooks that it should be removed by dissection is considered unsound, for on opening the area involved it will be found that the condition is not encapsulated and the tumour is made of a lace like mass filled with lymph Once the mass is opened it collapses and it is then not clear what should be removed Leakage of fluid from the wound predisposes to poor healing and the development of sepsis The suggestion that the condition is due to a congenital partial obstruction of the lymphatic duct entering the subclavian vein does not appear to be an adequate explanation of the

Sebaceous cysts about the scalp can be dissected out completely unruptured The method of bisecting the cyst initially, removing the sebaceous material and then dissecting out the halves of the sac is advocated by some, but complete excision is preferred by others, so long as the sac wall is removed completely either method suffices to effect a cure If a sebaceous cyst occurs about the face removal by dissection causes a fairly obvious scar in most cases The method of evacuation of the cyst by making a new entry into the cyst to replace the obstructed duct, as advocated by Danna,[10] gives very satisfactory results By this method the sebaceous material is expressed through the new opening made by diathermy puncture of the cyst and the cavity then contracts down within the next week to ten days The new duct must be kept open by the insertion of an oiled probe twice a week while the cavity is contracting down Finally there is a small punctate opening which gives a much better cosmetic result than where an incision is used It is also useful in infected cases permitting of permanent drainage Women appreciate this improved technique for cosmetic reasons The method of diathermy evacuation of Bartholin cysts and abscesses also gives much better and quicker results than where open excision is resorted to

Two tumour conditions seen very commonly in children in the tropics are hæmangiomata and congenital cystic hygroma of the neck The distribution of hæmangiomata has been noted by Chikiamco [11] to be as follows

	Per cent		Per cent
1 Face	56	5 Lower extremities	6
2 Trunk	14	6 Neck	5
3 Upper extremities	9	7 External genitalia	2
4 Scalp	8		

These figures are very close to the relative incidence of the condition in various parts of the body as seen in African children In most cases there is a smooth, almost purple-coloured area of irregular shape about the face, mostly close to the eye or the zygomatic area on one side In a few instances it is seen about the mouth and inside the cheeks as well as on the gums Cases involving the inside of the mouth are much more difficult to treat because of the element of infection present These congenital abnormalities enlarge alarmingly between the second and the sixth month After this they grow much less actively They can be effectively treated by applications of small doses of radium, but in the absence of such facilities in the tropics excellent results can be achieved by the use of various sclerosing solutions, the following are suggested and have all been tried by myself

Hypertonic saline, NaCl 20 per cent solution results very good
Quinine and urethane 20 per cent stronger solutions liable to cause necrosis
Sodium morrhuate is considered less satisfactory than either of the others above
Boiling water difficult to work with and may spill and cause scalds Not advised

Injection with hypertonic saline is very good, but if cases are treated in small numbers only, it is inconvenient having the solution made up freshly when they

JAW TUMOURS

Pathology affecting the jaw bones is of sufficient importance, because of its frequency in the tropics, to warrant a special section for the description of its clinical features and operative management The aspects which require particular attention are illustrated from personal experience Jaw tumours are much more common in many parts of the tropics than they are in Europe and North America. Singh and Cook,[13] writing on tumours of the jaw as seen in Uganda, East Africa, noted that they constituted 6 per cent of all tumours in African subjects In Europe and North America *they constitute only 1 per cent of all tumours* They observed seventy eight jaw tumours admitted to Mulago Hospital, Uganda, in eight years, that is, approximately one case every five weeks This indicates an



FIG 263
Three patients in hospital at the same time with jaw tumours of various sorts

astonishingly high incidence of these conditions The number seen in large hospitals in West Africa, though not so high as this, has amounted in personal experience to six per year, that is, one every eight weeks The relative frequency of these conditions is often not appreciated from out patient hospital statistics as the diagnosis is variously recorded under such terms as "ulcer of the mouth," "stomatitis" or even "dental caries"

Fig 263 shows three patients *all in hospital at the same time because of jaw tumours* The two male patients had not yet been operated upon, while the female patient in the centre had recently had an enormous jaw tumour removed It was *a dental cyst of the maxilla* Unfortunately no photograph was taken of this patient before operation, but some idea of the size of the cyst can be judged by the appearance of the X ray photograph (Fig 264) An incision can be seen on the left side of this patient's neck below the ramus of the lower jaw through which the [illegible] approach was employed to save two incisions, as it [illegible] external carotid artery on the same side at the [illegible] as brought up the midline of the chin and

condition It is personally thought that the condition is associated with a congenital abnormality of the thyrocervical artery Daseler and Anson [12] found only 46 per cent of subjects had this artery conforming to the standard description in anatomical textbooks As a result of an abnormally high pressure in this abnormal artery, it is thought that an excess of secretion of tissue fluids may occur in the area of its distribution which corresponds very closely to the location of cystic hygroma The lymphatic channels are unable to remove the fluid as quickly as it is formed and a localised swelling is thus caused This accumulation is therefore comparable in many ways to the fluid of ascites formed as a result of some degree of intrahepatic portal obstruction associated with hypertension in the hepatic artery It would





FIG 261 FIG 262

Fig 261—Cavernous angioma of left side of face in a child

Fig 262—Congenital cystic hygroma of the neck, right side

appear reasonable, if this is the explanation of the condition, to ligate the thyrocervical artery on the side of the tumour

An alternative method suggested is the insertion of floss nylon strands from the unaffected side of the neck to the cystic hygroma These can be introduced by inserting a long trocar and cannula from the normal side of the neck subcutaneously right through the tumour and coming out through the skin over the neck of the tumour Using a wire within the cannula a length of floss nylon is pulled through The floss nylon is then held over the tumour and the cannula removed The excess of floss nylon is then cut off at skin level on both sides and by massaging the neck gently the ends are withdrawn beneath the surface of the skin Two or three strands of floss nylon are introduced at three different levels which act as wick along which fluid can escape from the abnormal to the normal side This method is of some benefit it is simple and leaves no appreciable skin wound Strict aseptic precautions are essential in undertaking the method A similar procedure has already been advocated for the treatment of hydrocele in elderly men. In both instances the mass reduces to about half the original size, but does not return to normal

treatment of spirochætal conditions this form of gingivitis and pyorrhœa have not been encountered

Great care is necessary where there is any form of bone irregularity detected on examination of a patient's face in areas of the world where bone tumours are so common Singh and Cook [13] have *classified their list of jaw tumours in the* following manner

Sarcoma	19	Osteoma	2
Adamantinoma	17	Chloroma	2
Carcinoma	10	Unknown	2
Mixed salivary	7	Cementoma	1
Fibroma	5	Neuroblastoma	1
Fibrous epulis	5	*Melanoma*	1
Dentigerous cyst	5	Fibro adenoma	1

Forty-two of these were confirmed histologically—more than 50 per cent A less *rigid clinical classification from personal experience suggests the following figures*

	Per cent
1 Reticulo-cell tumour (sometimes reported as reticulo cell sarcoma of "atypical type'), thought to be possibly in some cases fungoid in origin, seen in children between 2 to 10 years mostly	35
2 Dental cysts of all sorts, unclassified Most commonly seen in the maxilla, particularly in female patients	25
3 *Osteoclastoma, an expanding type of tumour* Most common in the lower jaw in male patients	15
4 Sarcoma	10
5 Carcinoma originating in the maxillary antrum	10
6 Osteoma found most often about the angle of the jaw	5

Carcinoma is included for, although not a bone tumour, the epithelium of the maxillary antrum constitutes an integral part of the maxillary structure

Patients with jaw tumours complain most frequently of pain, swelling or disfigurement about some part of the face or inside of the mouth Only if bone tumours in the jaw are detected early can good cosmetic results be expected

Dental sinuses discharging at various points on the face surface as seen in Figs 266, 267, 268 are frequently sent to surgical clinics in the belief that they may be due to some form *of early jaw tumour There is some thickening adjacent* to the discharging area, but this is inflammatory in nature not neoplastic They are *invariably due to a chronic residual dental root which has caused an abscess* in the bone beneath it and this ultimately bursts into the soft tissues erupting on the surface of the cheek The condition is seldom seen in temperate areas of the world and when first encountered the condition is perplexing These cases should be treated in a dental department, but unfortunately few stations have the services of a skilled dental surgeon and so the condition must be dealt with by the doctor, who is expected to be able to cope with all conditions presenting for treatment irrespective of their nature It is considered worth mentioning this condition, as it is certainly ill recognised by those not having seen it nor appreciating its

through the lower lip so that the cheek could be turned up, allowing of excellent access yet ultimately producing a scar which was less conspicuous than if higher incisions had been used The appearance of the patient two months after the operation is shown in Fig 265 The final cosmetic result was gratifying

The reason why jaw tumours should be so common in the tropics is not obvious It is considered that the high incidence of sickle cell disease in African subjects may be a contributory factor, as it is in the case of osteomyelitis This blood abnormality causes a marked irregularity of density in bone structure and a state of instability in calcified tissues Osteomyelitis of the maxilla is also very

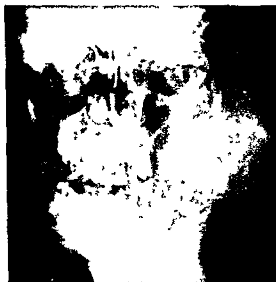


Fig 264



Fig 265

Fig 264—X ray photograph of skull showing maxillary bone cyst on left side
Fig 265—Convalescent patient following removal of maxillary cyst shown in Fig 264

common in African children The risk of osteomyelitis is considered to be twenty times that noted in young people who have no sickle cells in the circulation In almost 100 per cent of inflammatory bone conditions in African children the patients suffer from a sickle cell trait

The standard of dental hygiene varies greatly in different communities It is influenced considerably by the nature of the food taken If there is a deficiency of vitamin C there is an obvious tendency to softening of the gums Bleeding of the gums is characteristic of scurvy Granulomatous epulis is a common complication of scurvy These small masses form adjacent to rough surfaces at the base of the teeth and are often associated with a carious tooth which presents an irregular edge abutting on the soft tissues between the teeth Bismuth stomatitis was more common in the past, following the use of bismuth in the treatment of yaws, than at present Since the replacement of bismuth by penicillin in the

A small granulomatous epulis can be removed efficiently in most cases by the application of a minute-sized 20 per cent formalin-soaked plug of cotton-wool applied for twenty-four hours Care must be taken to prevent soiling of the adjacent healthy tissues as formalin has a corrosive action and burns tissues it comes into contact with With the larger type of epulis (Fig 269) it is usually necessary to remove one tooth which has been the precipitating cause of the epulis This permits of more adequate excision, thus preventing recurrence An epulis is rarely malignant If a tumour of the gum is of the hard type arising from the periosteal covering of the alveolar socket, it must be widely excised because of the risk of malignant changes in it A small amount of the alveolar bone edge should be removed by chisel with the epulis

In the absence of the skilled services of a dental surgeon doctors are obliged by compulsion rather than choice to undertake dental extractions for the relief of urgent and severe pain and as a preliminary to operating on the more serious jaw conditions Reasonable skill is required although no instruction may have been received during student or post-graduate studies One is hesitant to advise on the methods of dental extractions as this would seem to be an encroachment on a specialised field Requests have, however, been received from doctors working in country stations to have some advice included in this book on the subject The following remarks are thus given not as an expert, but as from one who has had to remove many hundreds of teeth during the past twenty-five or twenty-six years of surgical practice If a dental surgeon is available his services should certainly be sought, if not available, the doctor has no option but to deal as best he can with urgent cases as they arise All hospitals require a complete set of dental forceps It is obviously desirable to use the correct dental forceps for the extraction of any particular tooth Many dental forceps have the name of the tooth for which they are designed stamped on the handles Teeth are most frequently broken in an attempt to remove them, for the following reasons

1 *The forceps is improperly applied, being placed on the crown of the tooth only*

It is essential to obtain a firm and accurate grip of the tooth at a low level The points of the forceps should be pressed in well below the gum margins so that the points of the forceps reach down to at least the level of the alveolar edges It is not a disadvantage to place the forceps sufficiently low down to grip the uppermost part of the bony alveolar edge

2 *The forceps is incorrectly gripped in the hand*

If the dental forceps is incorrectly held in the hand and pressure applied to the handles in an adequately controlled manner, with a thumb round one handle and all the remaining fingers round the other, the tooth will certainly be crushed and broken unless it is already very loose and can be removed without the application of firm pressure The grip of the tooth should be only sufficiently tight to hold the forceps in position, it must not be used as a "nut cracker" In

significance In these cases a residual dental root can be detected in almost 100 per cent of the patients on radiographic examination Invariably a tooth is carious





FIG 266 FIG 267

Fig 266—Patient showing dental sinus from upper teeth erupting on cheek
Fig 267—Patient with dental sinus erupting through jaw opposite first lower molar tooth

or missing from the dental position nearest to the sinus Appreciating the frequency with which a dental root is present in the jaw substances in these cases, it is considered that where no X ray facilities are available an exploration of the area





FIG 268 FIG 269

Fig 268—Sinus of dental origin secondary to apical abscess about a lower incisor tooth
Fig 269—Epulis adjacent to position of upper incisor teeth

with dental forceps and an elevator should be made under general anæsthesia Removal of the root stops the discharge permanently within forty-eight hours The excess granulation on the surface can be removed with a pressure swab and does not recur No further treatment is necessary

stages It is most important to compare the level of the inner canthus of the eye on the two sides The line of angle of the palpebral fissure is *most important* The patient should be examined from directly in front with the head held absolutely straight, not deviating to either side The symmetry of the two nostrils is also very important Careful examination of the shape of the mouth is also useful as a means of detecting early deep-seated bone pathology The presence of loose or distorted teeth is significant X-ray photographs should be taken in both planes Stereoscopic X-ray examination is valuable if this can be carried out Comparison of the density of the sinus shadows on the two sides without bone distortion suggests changes in the soft tissues, these can be either inflammatory



FIG 270



FIG 271

Fig 270—Ectopic incisor tooth erupting in the right nostril
Fig 271—Child s faciomaxillary fistula following osteomyelitis of the maxilla

or neoplastic Discretion is necessary in differentiating between these two conditions

Infra red photography has been used in an attempt to detect early bone pathology about the jaws, but the results were not very conclusive It is rather difficult to estimate the correct focus using infra red films as the focus does not correspond accurately with the focusing on the ground glass screen of a reflex camera

Tissue removed with jaw tumours is seldom sectioned because of the slightly greater difficulty in selecting and removing a piece for section when bone is present in the specimen

Osteomyelitis is common in the maxilla of children in Africa The upper teeth on the corresponding side become loose and sequestrum formation with ulceration ultimately occurs within the buccal cavity or on the surface of the face A sequestrum emerges usually at one of three sites within the mouth, on the cheek at the zygomatic process of the maxilla, or close to the nostril (Fig 271) In some instances a sequestrum ulcerates into the mouth, having attached to it

between the base of the handles Fingers placed between the handles exercise a restraining influence to counteract the approximating action of the hand, the force being sufficient to maintain the forceps in position but not sufficient to crush the tooth Extra caution must be exercised in dealing with fragile carious teeth and the necessity for " going low " is even greater in such cases than where a moderately sound tooth is being removed because of an apical abscess being present

3 *The exertion of a direct pull without preliminary " rocking " of the tooth*

Extraction must be carried out by a ' rocking " action in all directions initially to loosen a tooth in the socket before any traction is applied Wrist movement is used while the elbow and shoulder are firmly fixed by a consistent and well controlled muscular action For those with limited experience it is sometimes helpful to steady the elbow on one's own body Shoulder traction must certainly never be used To speak of " rocking out " teeth would be more accurate than ' pulling out " teeth for it is essential to rock the tooth both at right angles to the line of the teeth and with a rotatory pivot like action in the vertical line By a combination of these two actions, alternately employed, the thin alveolar socket edges are fractured minutely, thus loosening the tooth before finally exerting a distracting action which withdraws the tooth from its socket Dental extractions should not be hurried unduly and the anæsthesia employed must be adequate to allay the discomfort of extractions This method of loosening teeth by rocking in alternate planes is well illustrated by the method of withdrawing a nail partly hammered into a piece of wood When the nail is pushed in both directions and rotated in a circular manner the uppermost part of the hole in which it is placed is enlarged till ultimately the nail can be pulled out without undue difficulty, as it is held only at its apex by the wood The removal of supernumerary teeth and impacted molars calls for extra skill and sometimes a little ingenuity In young adult patients where the bone of the jaw is particularly strong it is sometimes an advantage to use a dental elevator to clear away the soft tissues of the gum before gripping the tooth concerned, this permits of placing the dental forceps more deeply so decreasing the risk of breaking the roots during extraction

Fig 270 shows an unusual supernumerary tooth appearing in the nostril It was removed without undue difficulty Oddly enough it was sent from a dental department to a surgical unit for removal There was no evidence of bone pathology being associated with it

Although jaw tumours may start at any part of the jaws, the most usual site for neoplastic changes to take place is adjacent to the bicuspid teeth This is embryologically a rather complicated area corresponding to the termination of Meckel s cartilage in the lower jaw Possibly for this reason it is less stable than other parts Being about half way along the inferior ramus of the jaw, it is of course encroached upon by tumour behind this point and in front of it, so it is directly encroached upon in any case giving the impression that it is a particularly vulnerable area Dental cysts are much more common in women than in men They start most often about the position of the first upper molar tooth on either side When the mandible is affected asymmetry of the face is noted at an early stage Early asymmetry when it affects the maxilla is more difficult to detect at the very early

tumours of the adamantinoma variety are invariably associated with the absence of one tooth which has never erupted but remains hidden as a vestigial remnant in the deep tissues of the jaw This abnormal dental bud subsequently becomes a source of abnormal activity in later life The tumour arises from these embryonic remnants

Dental cysts often reach an enormous size as seen in the X-ray photo (Fig 264) Unfortunately no ordinary photograph was taken of this patient before operation, but the size of the cyst can be judged from the appearance of the skull X-ray picture which shows the bony outline of the cyst quite clearly Although this was a very large dental cyst, it was removed without undue difficulty

approached

ower face-

tissues over

containing adrenaline 1 in 200,000 solution, thus decreasing the bleeding from the mucous membrane and periosteal layers over the tumour surface When the bony surface is cleared of the covering layers a flake of eggshell-like bone is gently fractured and a fragment of bone removed over the most prominent part



Fig 273
Diagram of facial incisions for approach to jaw tumours



Fig 274
Sac of dental cyst removed complete from patient shown in Fig 265 and in X ray, Fig 264

Further bone is detached by the use of nibbling forceps giving access to the lining membrane of the cyst The cyst is pushed off the bony wall in which it lies, using blunt dissection Fig 274 shows a cyst of this sort dissected-out The cyst can be dissected out without rupture in many cases In some instances it ruptures when almost completely detached, but held at one area only where it is adherent

to the base of a tooth *At this stage it often ruptures when the tooth is being elevated* with an instrument When the fluid contents escape the cyst looks much smaller A Kocher's blunt dissector is a most useful instrument for use in removal of dental cysts A Negus tonsil dissection knife is helpful in dividing strands of tissue holding the cyst to the bony wall of the cavity in which it is placed If a dental *cyst is large it is advisable to tie the external carotid artery in the neck before* attempting to remove the mass This decreases hæmorrhage at operation If ligature of the artery is anticipated the lowly-placed incision beneath the ramus of the lower jaw is useful for tumours in either the maxilla or the mandible, as through it the artery can be tied and the tumour removed as well This obviates the necessity for a second incision as would be required if either of the higher



Fig 275



Fig 276

Fig 275—Maxillary tumour in child—possibly of fungoid origin
Fig 276—Child showing extension of maxillary pathology to both sides

facial approaches were used The external carotid artery should certainly be tied before an attempt is made to remove the maxilla for malignant tumours within the antrum

Because of the serious risk of blood loss patients should not be operated upon for the removal of jaw tumours unless their hæmoglobin level is at least 80 per cent It is advisable in all jaw tumour operations to give a blood transfusion during the operation If this *is not done there will be an unduly high operative mortality*, far exceeding that which might otherwise be achieved

One of the most frequent and serious forms of jaw tumour in West Africa is that seen in young children mostly between the ages of 4 and 10 years (Fig 275) The tumour starts within one maxillary antrum There is early loosening of the upper teeth The soft tissues become infected at an early stage and a rapidly fungating mass ultimately ulcerates into the mouth, having destroyed the hard palate and alveolar area of the jaw The condition invariably kills the child within eight to twelve months The cases are almost all beyond all hope of cure by operative means when first seen Hospital statistics do not reflect accurately the

gravity of this condition An ambiguous diagnosis is usually entered in the out-patient registers which has a bearing on the nature of the disease without indicating the nature of the pathology The child usually shows emaciation, enlargement of the spleen and a cough, which are the characteristics of histoplasmosis when associated with a local lesion affecting bones From many of these cases tissue has been removed for section, but in most cases a report is returned indicating [illegible] e of the [illegible] on is a [illegible] antrum often becomes affected (Fig 276) in the second six months of the disease is very unlike a true tumour and the impression is gained that the condition may be due to histoplasmosis of the small variety which is difficult to identify It will be remembered that histoplasmosis has a strong predilection for reticular cells It is considered that these cases should be investigated appropriately along lines suitable for the detection of this condition A chest X-ray examination should certainly be undertaken and the sputum examined for fungus cells of the yeast-like type Sternal puncture for bone marrow examination is also indicated A histoplasma skin test may help Examination of tissue from the antrum, using transnasal puncture, permits of investigation without submitting the child to a dangerous surgical procedure without much hope of cure

The term "sarcoidosis" is sometimes used for conditions of this sort Solomons,[14] writing on sarcoidosis, suggests that the appearance of tissue removed in cases of sarcoidosis is strongly suggestive of tuberculosis, but no tubercle bacilli can ever be found This is precisely the character of histoplasmosis—"like tuberculosis, but with no tubercle bacilli present" In America such conditions are noted to be more common in coloured children than white Culture examinations made on appropriate media for the growth of fungus conditions should be employed using tissue removed from the tumour mass and from sputum Birsner and Smart,[4] working in America, reported eighteen cases of ossius coccidioidomycosis detected by radiology The condition, which is also a fungus infection, was noted most often in the bones of the face and in some instances in the bones in the distal parts of the extremities The fact of the bones of the face being infected by another type of fungus is very significant He comments on the difficulty of treatment in these cases Methods of treatment for fungoid conditions have already been referred to in the section on Infections and Ulceration (Chapter 18) Quite recently, in 1959, the Committee of Chemotherapy and Antibiotics of the American College of Chest Physicians[15] have noted the beneficial effect of Amphoterecin B in the treatment of fungoid diseases The method of treatment is difficult, as the drug is not effective by mouth Amphoterecin B must be given by the slow intravenous drip method A dose of 1 mg per kilo of body weight is given over a period of six hours daily for thirty to sixty days In view of the inoperability of these cases in children and the uncertainty of the diagnosis in many instances, treatment along empirical lines would certainly be justified This condition requires more adequate investigation by research workers in the tropics where the condition is so frequently noted

The aim of tumour surgery is to remove the pathological mass in its entirety. The prognosis in cases of carcinoma of the maxillary antrum is poor unless the condition is detected at a very early age. The prognosis in cases of osteoclastoma and dental cyst is reasonably good as the conditions are well localised. General anæsthesia is advised in all cases; local anæsthesia is unsatisfactory. Anæsthesia through an endotracheal tube greatly facilitates the surgical procedure because of the ease with which the larynx can be packed off completely during the operation. This decreases the risk of pulmonary complications. Anæsthesia given on an open mask intermittently is unsatisfactory in these cases. Intravenous anæsthesia supplemented by general anæsthesia given at intervals as required is also unsatisfactory and not devoid of danger because of the hypotensive effect of intravenous barbiturate drugs.

The appearance of a patient with a jaw tumour suggests that the mass is very much larger than in fact it is found to be when removed. This can be illustrated quite easily by putting a foreign body in the buccal sulcus between the cheek and either the maxilla above or the mandible below, even a plum stone or a mango stone placed in this position causes very marked distortion though bone tumours of such sizes might not be classed as very large tumours. Many small tumours placed far forward in the jaw bones can be removed through the mouth without supplementing the opening by a facial incision. With large tumours placed posterior to the bicuspid teeth a facial incision of some sort is necessary. There are three standard facial incisions for approach to jaw tumours as illustrated (Fig 273).

1 Upper facial incision, maxillary tumours only, cosmetic result poor, length 6 in.
2 Mid-facial, for upper or lower jaw tumours, minimal blood loss, length 3 in only, cosmetic result fairly good, incision passes above salivary duct.
3 Lower facial incision for mandibular or maxillary tumours, excellent cosmetic result, length 6 in, external carotid artery can be tied through this incision also.

Any incision which does not adjoin the mouth gives very limited access and is contraindicated, except in the rare cases where an osteoma about the angle of the jaw is being removed. A local incision behind the angle of the jaw may be used in such cases. Osteomata of the mandible are most common at this position, they are usually small and very hard bony growths enlarging very slowly. It is suggested that the lateral mouth incision is the most suitable and safest for those with limited experience. The bleeding from this incision can be controlled easily and is therefore minimal. Access is excellent for upper or lower jaw conditions and the cosmetic results are reasonably good. The wound is very easy to close accurately, the initial suture being placed in position at the angle of the mouth, it is then used as a retractor to approximate the edges to be sutured. It is of particular value in cases where no blood is available for transfusion. In operating on jaw tumours blood loss is much reduced if a solution of 1 in 200,000 solution of adrenaline in water is used to infiltrate all soft tissue layers before they are incised.

In dealing with dental cysts an adequate set of bone nibbling forceps is essential Citelli's bone forceps is a most useful instrument Blunt dissecting instruments are also very useful in separating the sac wall from the bone in cases of dental cyst An angled tonsil dissection knife of the Negus pattern is most useful for dividing the fibrous bands of tissue attaching the cyst wall to the adjacent bone A good headlight is very useful, particularly in country stations where in some instances illumination is inadequate The major expansion in bone cysts is in the outward direction in most cases so that when the excess bone is removed from the lateral aspect the soft tissues return to approximately their normal position Fig 265 shows a convalescent patient two months after removal of a large bone cyst Fig 264 is the X-ray photograph of this patient before operation The incision used was of the type where the lower lip is divided and the incision carried round below the inferior ramus of the mandible The external carotid artery was tied through the posterior part of the incision The final cosmetic result was satisfactory

The mortality rate is much higher following the removal of lower jaw tumours than after removal of maxillary growths This is because of the difficulty of controlling the tongue in patients who have lost the central area of the jaw to which the tongue is attached A monofilament nylon loop should be inserted through the tongue at operation so that it can be used as a retractor during the first forty-eight hours following operation A special nurse is required to care exclusively for each patient following an operation for a jaw tumour If this rule is not insisted upon the post-operative rate will be greatly increased If the jaw is divided and a portion removed the two sides should be kept apart with a Kirschner wire inserted into the medullary cavity as a semicircular endomedullary splint Within one month of removal of a jaw tumour a very strong fibrous band forms which has the consistency of fibrocartilage so that a bone graft need not be inserted The Kirschner wire can then be removed if this is desired

It is considered desirable to undertake a tracheotomy for the maintenance of an adequate airway in all cases where the lower jaw has had the symphysis removed This greatly facilitates the immediate after-care of the case A temporary gastrostomy is also an advantage in lower jaw cases Such secondary operations are not required when upper jaw tumours are being operated upon as there is no loss of control of the airway or deglutition

INCIDENCE OF MALIGNANT DISEASE

There is a marked difference in the incidence of particular forms of malignant disease in various parts of the world In Europe the overall incidence of carcinoma is slightly higher in women than in men This is because of the high incidence of malignant disease of the uterine cervix and cancer of the breast in female patients If these two latter conditions are excluded the rate of malignant disease is slightly higher in men than in women My own figures for malignant disease in West Africa indicate the order of frequency of individual carcinomata as being carcinoma of the cervix uteri, primary malignant disease of the liver, then bladder, penis, prostate, stomach, skin of the leg, breast, thyroid gland and finally bowel Primary

carcinoma of the liver is found almost exclusively in male patients in Africa, the incidence being about thirty males to one female Fig 57 shows a female patient with primary carcinoma of the liver, the photograph was taken because of the rarity of the condition in women Photographs of patients with this condition are seldom taken as there is little to show in the photograph Primary liver carcinoma is undoubtedly the most common form of malignant disease in male adult African patients Bersohn [26] found primary carcinoma of the liver to be the most common form of malignancy in the Bantu Africans This form of malignant disease is the one which comes most frequently to autopsy examination, the reasons being that with it there is difficulty in making a certain diagnosis, the condition is fatal and



Fig 277



Fig 278

Fig 277—Case of carcinoma of skin of the foot

Fig 278—Rodent ulcer of face in albino African patient Dr C S Hoffman s case Ghana

patients are much incapacitated during their terminal illness They are unfit to return to their homes prior to decease There is often excess fluid in the peritoneal cavity and the patients are unable to move about easily There is also respiratory embarrassment in many instances

The frequency with which biopsy specimens are submitted for examination from easily accessible tissue would suggest from laboratory statistics that the incidence of skin carcinomata is relatively much higher than in fact it actually is Carcinoma of the urinary bladder (Fig 79) is very common in African patients, especially in areas where schistosomiasis is encountered This form of malignancy is particularly common in Egypt where there is also a very high incidence of schistosomiasis Edington [18] listed the frequency of various forms of carcinoma as noted at post mortem examinations and compared these findings with figures from other parts of Africa The figures are given as percentages relative to total carcinomata An extract is appended for study Skin carcinoma (Fig 277) showed the highest percentage incidence figure, 13 9 per cent in the Gold Coast, and

primary carcinoma of the liver the next highest—7 6 per cent In French West Africa *primary liver carcinoma* showed much the highest incidence, 25 7 per cent, and was more than double that of carcinoma of the skin, 12 5 per cent At a clinical meeting of the Mulago Medical Society in Uganda, East Africa,[17] it was considered that comparing comparable organs, malignant disease was much more frequently encountered in men than women The order of frequency with which malignant disease was found was noted to be—the penis, leg, lymphatic tissue, Kaposi's sarcoma, the jaws and the breast There was a high incidence of carcinoma of the male breast (Fig 256) The following malignant tumours were considered rare—rodent ulcers, carcinoma of the bladder, prostate, intestinal tract and the tongue Carcinoma of the liver was believed to be the form of malignant disease most frequently coming to autopsy examination Basal cell carcinoma although rare in most Africans is seen in albino Africans (Fig 278)

Liu,[18] making a comparative study of primary carcinoma of the liver in different parts of the world, gives the following findings

	Per cent Autopsies	Per cent of total Carcinomata
1 Bantu Africans	1 2	37 4
2 Semi-Bantu peoples	*—	18 7
3 Orientals generally	0 85	14 1
4 Chinese (Peking)	0 78	11 4
5 American	0 25	2 1
6 European	0 13	1 1

* No figures given

There seems no doubt whatever, from the literature consulted, that primary carcinoma of the liver occurs more frequently in male African adults than in people of any other race in the world Thijs[19] also made a comparison between the incidence of individual conditions observed with the figures noted in Europe Primary carcinoma of the liver and Kaposi s sarcoma were much more common in Africa than Europe The same applied to skin malignancy, the penis was very frequently affected as was also the vulva The male breast was noted to be often affected Chorionepithelioma, ovarian tumours and retinoblastomata were also more common in Africans than in patients in Europe The same applied to reticulo endothelial tumours and sarcomata Tumours less frequently noted in the Congo than in Europe were carcinoma of the intestinal tract, lungs and prostate

Primary bronchial carcinoma is a form of malignant disease with its highest *incidence in* Europe and North America It is rare in most indigenous peoples of the tropical world Raper, Elmes and Musoke[20] made the following observations on primary carcinoma of the lung in Africa

1 The condition is much less common in African subjects than Europeans
2 In Kampala, East Africa, two cases noted in 2,994 post mortems in fifteen years up to 1947
3 In Kampala more recently one case diagnosed clinically and five cases found post mortem

4 In Nairobi no case noted in post mortem book up to the date 1952
5 In Southern Rhodesia no case noted in a series of 751 post mortems (no dates)
6 In Johannesburg, South Africa, no case in 1,901 post mortems (Africans) up to 1952
7 Lagos, West Africa, six cases in 7,000 post mortem examinations up to 1947

Gelfand [21] has encountered five cases of bronchial carcinoma in Africans in Southern Rhodesia in 2,000 post mortem examinations Personally no case has been recognised clinically in African subjects in twenty three years Two or three cases initially thought to be malignant disease of the lung were found on investigation to be due to a pulmonary abscess and the patient improved slowly in each case and ultimately recovered with appropriate treatment Chung,[2] comparing the incidence of primary carcinoma of the liver in Chinese and African subjects, noted that the incidence of the disease was higher in African than Chinese in the ratio of 3 to 2 1 The predominance of the condition in male subjects was obvious, being fourteen men to one woman The diagnosis was confirmed in all cases in his series by either liver puncture biopsy or at laparotomy Edington [16] noted that almost invariably primary carcinoma of the liver followed cirrhotic changes in the organ, these may in turn be associated with malnutrition and schistosomiasis Undoubtedly schistosomiasis is an important ætiological factor in the production of cirrhotic changes and therefore indirectly has a bearing on the incidence of malignancy Stransky and Felix,[23] working in the Philippine Islands, made the following observations about malignant disease as seen in that area of the world

1 The incidence of liver carcinoma is higher in tropical than non tropical countries
2 Gastric carcinoma is relatively infrequently seen in the Philippine Islands
3 Skin carcinoma about the tissues of the neck is prevalent
4 Carcinoma is often superimposed on chronic leg ulcers (Fig 279)
5 Liver carcinomata frequently associated with *Schistosoma japonicum* infection
6 Carcinoma of the female breast is commoner in Philippinos than Africans
7 Carcinoma of the uterus is commoner in women in the Philippines than in Europe
8 There is an abnormally high incidence of chorionepithelioma in South East Asia
9 Carcinoma in leg ulcers is more common in Africa than in the Philippines

There is no doubt on reading many papers on chorionepithelioma that the condition is pre eminently the outstanding carcinoma noted in many parts of Far East Asia It may not necessarily show the highest incidence, but it is very fatal and relatively very much more common in Eastern Asiatic countries than in Europe, America or Africa Hou and Pang [24] report a very high incidence of chorionepithelioma in female patients in Hong Kong Their figures show one case in every 114 post mortem examinations undertaken There was one case in every 3,708 pregnancies under observation Death in these cases is ultimately due to hæmorrhages, external or internal, from the primary or secondary growths

In Europe carcinoma of the cervix uteri was probably the most common form of malignant disease up to about 1940, but with the progressive increase of primary carcinoma of the lung since 1930 in both male and female subjects, the overall rate of primary malignant disease of the lung is assuming proportions close to that of carcinoma of the cervix in female patients With this alteration in trend, malignant disease of the intestinal tract is becoming relatively though not actually less common in Europe

Primary carcinoma of the lung is considered to be predominantly a disease of Europe and North America In African subjects there is a relatively high incidence of various forms of jaw tumours, being about six times more frequent than in Europe Kouwenaar,[25] considering the incidence of malignant disease in Indonesia, notes that the overall rate of malignancy in that area is approximately



FIG 279
Chronic ulcer of the leg showing malignant changes

the same as in Europe Chinese and Javanese men have a higher rate of liver carcinoma than that noted in other people in Indonesia Gastric carcinoma is relatively common in Chinese men, but much less usual in Javanese men In women malignant disease of the uterus and the breast form the highest incidence of cancer Carcinoma of the cheek occurs more frequently in those who chew betel nut than in those who do not Melanotic carcinoma is common about the face, legs and feet Carcinoma of the penis is frequently seen in circumcised Javanese men, which is unusual, as carcinoma at this site is generally considered to be rare in circumcised men elsewhere in the world

It is necessary to exclude various tropical diseases before diagnosing a tumour mass in the tropics as carcinoma This applies to conditions due to *Schistosoma* and *Entamœba histolytica* affecting the bowel The possibility of *E histolytica* causing a painful fungating mass of the uterine cervix in women has already been pointed out elsewhere Fungoid infections, too, are capable of causing large tissue masses as seen in infections of the actinomycosis and nocardia groups, other fungus conditions may act similarly causing confusion in diagnosis

Intra abdominal guinea worm cysts and hydatid cysts require careful differentiation Wherever possible the diagnosis should be confirmed microscopically As patients are often unwilling to accept radical surgery in the treatment of advanced tumours, it is often not possible to arrive at a diagnosis by removing tissue following operation They will, however, usually agree to needle biopsy which can in many instances be undertaken with the Vim Silverman type of biopsy needle Patients in the tropics like injections and this willingness to accept injections should be made use of not only in treatment, but also as an aid to diagnosis Sufficient material can be removed by this method for microscopic section of pathological tissue The incidence of eye tumours appears to be higher



Fig 280 *Fig 281*

Fig 280—Advanced sarcoma of the lower end of the r ght femur

Fig 281—Large ang omatous sarcoma of the blood vessels of the scalp

in many parts of the tropics than in Europe, but this may be apparent rather than real Early treatment of eye tumours in Europe hides them from view so that they are certainly less obvious Advanced sarcoma (Fig 280) is unfortunately also seen, but it is less frequently noted than carcinoma in West Africa Fig 281 shows an advanced angiosarcoma of the scalp

DIFFERENTIAL DIAGNOSIS AND TREATMENT

The nature of treatment indicated in tumour cases is dependent on the type of pathology present Some consideration has already been given in former chapters to the management of malignant conditions at various sites The success of surgical treatment is dependent on the removal of all the malignant tissue In early cases where the disease is still limited to one non-essential organ such as the breast, radical removal of the complete structure cures the disease Where the regional lymphatics are involved these, too, must be removed If the condition

has spread beyond any of the primary lymphatic gland systems the prognosis is bad Early and accurate diagnosis and treatment are therefore essential

There are various skin tests which may be undertaken to exclude known non-malignant diseases such as hydatid disease, schistosomiasis, amœbiasis of the extra-colonic type and histoplasmosis The use of such tests is helpful as a method of eliminating non-malignant conditions They are always open to the fallacy that a positive result does not exclude malignant disease being present in addition to the condition detected by the skin reaction Malignant changes frequently occur superimposed on chronic inflammatory conditions The fact that such skin tests are negative is sometimes helpful as a means of excluding the condition for which the test is specifically designed Microscopic examinations of urine and



Fig 282



Fig 283

Fig 282—Osteochondroma of the upper end of the right humerus removed from patient, Fig 283

Fig 283—Patient from whom above large benign bone tumour was removed

stool specimens should be undertaken as they, too, often point to the presence of a tropical disease of the urinary or intestinal tract Sputum examination is also valuable in this respect Discharges from open lesions should also be examined, both stained and unstained *Entamœba histolytica* is sometimes detected unexpectedly The microscopic detection of malignant cells in fluid accumulations secondary to a growth is sometimes possible Biopsy and microscopic examination of stained tissue is undoubtedly the most satisfactory method of making a positive diagnosis of malignancy Needle biopsy of deep-seated tumours should be made use of much more frequently In some instances it is possible to remove sufficient tissue by this means to prepare a block for tissue section This avoids the necessity of undertaking a laparotomy In a limited number of cases pathological tissue may be removed through endoscopic instruments, making possible section of tissues from the bladder, the distal colon and rectum as well as the trachea and œsophagus Appropriate instruments are designed for use in these various sites

The size of a tumour *per se* should not be taken as evidence of malignancy Fig 282 shows a photograph of a benign tumour removed from the upper half of the right humerus It was an enormous chondroma Two years later a picture was taken of the patient (Fig 283) from whom it was removed This enormous tumour was equal in size to the patient's head He insisted that under no circumstances should the arm be removed as the hand and all tissues below the tumour were quite normal and functionally efficient It was therefore decided to attempt removal of the upper half of the humerus only and attempt an arthrodesis between the remaining part of the humerus and the glenoid cavity of the scapula The chance of achieving a good functional result was considered to be poor The operation was carried out, using general anæsthesia, under very



Fig 284
Patient with chondromatous tumour of the fourth metacarpal bone of the left hand

adverse conditions in a remote country station, but the result was gratifying Unfortunately no photograph was taken of the patient before the operation, but the specimen removed gives a fair indication of the very large size of the chondroma excised When the patient was examined two years later it was found that the function of the arm operated upon was excellent A false joint developed at the scapular position The short upper arm on that side is quite obvious There is marked prominence of the acromial process A somewhat better cosmetic result might have been achieved had this been removed at the time of the initial operation, but this was considered inadvisable

A patient is shown (Fig 284) with a large chondroma of the fourth metacarpal bone of the left hand This tumour, too, was removed without difficulty The bone involved was excised completely and the ring finger with its tendons which lacked support after the metacarpal was removed The third and fifth fingers were then approximated and the final cosmetic result was satisfactory

Bersohn,[20] considering liver tests in cases of primary carcinoma of the liver, was of the opinion that the most valuable single test indicating the presence of

primary malignant disease of the liver was an estimation of the level of the serum mucoprotein Other tests were less distinctive In health there is a normal fixed level of the various protein and chemical constituents in blood These levels alter in various respects with different diseases A blood sedimentation test is dependent on an adequate viscosity of the blood serum due to the normal protein fractions present In any form of disease where there is tissue destruction present the rate of fall of the red cells in suspension is increased The normal rate of fall is between 2 and 5 mm in the first hour Higher rates of fall are suggestive of blood serum changes secondary to disease associated with tissue destruction This test is considered of some prognostic value in cases of tuberculosis even though there has been much controversy over the rationale of the test and interpretation of the results in various conditions A blood sedimentation test is also of some value in cases where patients suspect that they are suffering from some form of malignancy even though there is no clinical evidence of this It can be said with fair certainty that a patient who has a normal blood sedimentation rate is most unlikely to be suffering from any form of malignant disease To be able to report a perfectly normal sedimentation rate is very reassuring to a patient In malignant disease the sedimentation rate is invariably slightly raised, if not very much so, until the advanced stage of the disease is reached

The ease with which a Bolen's blood slide test [27] for malignancy can be carried out commends it as a useful practical method of testing a patient for malignancy under circumstances where, as in a country hospital in the tropics, complicated laboratory tests are impracticable This test is rather like a modified form of sedimentation test or certainly is dependent on the same basic factor, namely an alteration in the protein content of the serum The test has already been referred to in Chapter 7 and therefore only brief reference is here made for completeness in this chapter Fig 285 shows three preparations of whole blood on microscope slides to illustrate the results A drop of the patient's blood is taken, spread and allowed to dry in air on a clean dry microscope slide which is placed in the horizontal position on a table, no chemicals of any sort are added The blood of a healthy patient with no malignant disease dries in a fairly uniform pattern The inner two-thirds of the drop which is spread over an area of about 1 in is seen when dry to be a little thicker than the part in the outer third of the area In cases of malignant disease there is clumping of the red cells with "gapping" between them or clear channels giving an appearance not unlike that noted when incompatible bloods are mixed during cross matching Early malignancy gives an appearance intermediate between the non-malignant blood and that taken from a patient in an advanced stage of malignant disease The test is considered to give about 90 per cent correct results in cases of malignancy Thomas,[28] using this test in India, considered it to be of considerable value She suggests that six slide drops should be made with the blood from each patient being examined to decrease the likelihood of error, she also suggests that blood from a healthy patient should be used as a control The test is invalidated by certain conditions —pregnancy, following intravenous saline transfusion, blood transfusion, and in cases of advanced non-malignant disease of the liver With these exceptions, it is considered of value

Navarro and Navarro [29] have used the Beard antrone test for the detection of malignant disease This test depends on the fact that persons in good health excrete a small amount of pituitary gonadotrophin in the urine In cases of carcinoma and cases of pregnancy there is an increased output of gonadotrophin in the urine Normal pituitary gonadotrophin excreted in healthy persons is not digested by chymotrypsin On the other hand, gonadotrophin produced as a

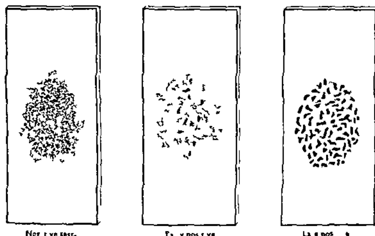


FIG 285
Diagram illustrating Bolen s blood slide test for malignant disease

result of pregnancy and carcinoma is digested by chymotrypsin It is, therefore, necessary in testing a patient for carcinoma by this method to first estimate the total output of gonadotrophin in a specimen of urine A second specimen of equal quantity is then taken and treated with chymotrypsin , the amount of gonadotrophin is then again estimated and if the second result is lower than the first, it indicates that some gonadotrophin has been removed by the digestion with chymotrypsin and conversely that the amount of gonadotrophin removed corresponds to the amount due to malignant disease (if pregnancy can be excluded) The test is therefore applicable to male patients and non pregnant women The number of units of gonadotrophin present is estimated by the use of an electrophotometer Normal gonadotrophin readings run between o and 30 units In cases of malignant disease the readings usually vary between 100 and 300 units

In patients suffering from advanced carcinoma whose condition cannot be eradicated by surgery, it is suggested that instead of using strong sedatives for a prolonged time during the terminal illness, much greater relief can be afforded by the employment of a prefrontal leucotomy Fig 59 shows a patient for whom this operation was undertaken on both sides because of a very advanced and painful carcinoma of the prostate The leucotomy approach was made in this case through a trephine opening in each temporal area Following this operation there is temporary incontinence of urine This condition improves and urinary control is regained after about three weeks When a frontal leucotomy is carried out by the anterior approach, passing the leucotome through the supraorbital plate of

the frontal bone, urinary symptoms are said to be less marked This newer anterior approach has not been used personally The operation is not only a benefit to the patient, but also relieves the anxiety of the relatives greatly as following it the patient becomes composed, sleeps well and take food more freely His concern over the gravity of his illness is also less apparent The procedure is easy to carry out, the operative risk is very low and the results are most satisfactory, it is, therefore, worthy of consideration This operation should be reserved for cases where the primary growth is advanced beyond the scope of direct surgical approach Only in a few of the large centres in the tropics is X-ray treatment available for the management of malignant disease

EXTRACT

"Malignant disease in the Gold Coast" G M Edington *Brit J Cancer*, 1956, 10, 595

The incidence of various tumours compared to the total incidence of malignant disease seen in Africans in the Gold Coast, Uganda, Nigeria and French West Africa (Percentage figures shown in brackets)

Types of Tumours	Gold Coast 1,193	Uganda 734	Nigeria 1,000	French West Africa 1,884
Carcinoma—				
Squamous celled, of skin	166 (13 9)	100 (13 6)	122 (12 2)	235 (12 5)
Basal celled, of skin	12 (1 0)	1 (0 1)		24 (1 3)
Liver	91 (7 6)	56 (7 6)	81 (8 1)	484 (25 7)
Uterus and cervix	71 (6 0)	70 (9 5)	68 (6 8)	100 (5 3)
Breast	64 (5 4)	29 (4 0)	84 (8 4)	103 (5 4)
Stomach	43 (3 6)	23 (3 1)	22 (2 2)	43 (2 3)
Salivary glands	40 (3 3)	10 (1 4)	60 (6 0)	66 (3 5)
Ovary	33 (2 8)	36 (4 9)	27 (2 7)	36 (2 0)
Bladder	30 (2 1)	20 (2 7)	18 (1 8)	31 (1 6)
Prostate	25 (2 1)	19 (2 6)	8 (0 8)	24 (1 3)
Adamantinoma	22 (1 9)	10 (1 4)	18 (1 8)	50 (2 7)
Large intestine	20 (1 7)	19 (2 6)	14 (1 4)	23
Nasopharynx	14 (1 2)	18 (2 5)	19 (1 9)	
Thyroid	13 (1 1)	5 (0 8)	14 (1 4)	17 (0 9)
Pancreas	11 (0 9)	7 (1 0)	7 (0 7)	13 (0 7)
Testis	10 (0 8)	1 (0 1)	7 (0 7)	5 (0 3)
Kidney	7 (0 6)	5 (0 8)	10 (1 0)	12 (0 6)
Lung	4 (0 3)	8 (1 0)	5 (0 5)	5 (0 3)
Sarcoma	159 (13 3)	57 (7 8)	137 (13 7)	95 (5 0)
Kaposi's	10 (0 8)	27 (3 7)	24 (2 4)	5 (0 3)
Osteoclastoma	45 (3 6)		23 (2 3)	
Lymphosarcoma and lymphatic leukæmia	45 (3 8)	37 (5 0)	53 (5 3)	119 (6 3)
Hodgkin's	30 (2 5)	7 (1 0)		35 (1 9)
Reticulosarcoma	22 (1 9)	6 (0 8)		63 (3 3)
Myeloma	7 (0 6)	2 (0 3)		12 (0 6)
Leukæmia	9 (0 8)	11 (1 5)		16 (0 8)
Retinoblastoma	18 (1 5)	3 (0 4)	21 (2 1)	13 (0 7)
Glioma	3 (0 3)		3 (0 3)	8 (0 4)
Melanoma	63 (5 3)	13 (1 8)	62 (6 2)	49 (2 6)
Chorionepithelioma	21 (1 8)	3 (0 4)	9 (0 9)	
Teratoma	8 (0 7)	14 (1 9)	3 (0 3)	
Nephroblastoma	7 (0 6)	12 (1 6)	4 (0 4)	

REFERENCES

[illegible]

3 Heilbrunn, A (1950) Amœbiasis vaginæ *Docum neerl indones Morb trop* 2, 118

4 Birsner, J W & Smart, S (1956) Osseus coccidioidomycosis *Amer J Roentgenol* 76, 1052

5 Emam, A M (1958) Malignant change in a rhinoscleromatous ulcer *J Egypt med Ass* 41, 310

6 Becker, B J P & Dorfman, R F (1956) Rhinoscleroma—Report of a case in South Africa *S Afr med J* 30 (1), 581

7 Rafero, E D (1951) A case of rhinoscleroma *E Afr med J* 28, 315

8 Jelliffe, D B (1952) Rhinoscleroma in a Nigerian male *W Afr med J* 1, 122

9 Fain, A & Falaise, A (1957) A propos du rhinosclerome au Ruanda-Urundi *Ann Soc belge Méd trop* 37, 67

10 Danna, J A (1946) The treatment of sebaceous cyst by electro-surgical marsupialisation *Ann Surg* 123, 952

11 Chikiamco, P S (1957) Radiological treatment of hæmangiomata *J Philipp med Ass* 33, 571

12 Daseler, E H & Anson, B J (1959) Surgical anatomy of the subclavian artery and its branches *Surg Gynec Obstet* 108, 149

13 Singh, P & Cook, J (1956) Tumours of the jaws *E Afr med J* 33, 383

14 Solomons, B, Jr (1956) Sarcoidosis *Irish J med Sci* p 417

15 Amer Coll Chest Physicians (1959) Chemotherapy of specific infectious diseases of the lower respiratory tract *Rocky Mtn med J* 56, 57

16 Edington, G M (1956) Malignant disease in the Gold Coast *Brit J Cancer*, 10, 595

17 Records Mulago Medical Society (1951) A review of cancer in Africans *E Afr med J* 28, 474

18 Liu, Y (1953) Primary carcinoma of the liver *Chin med J* 71, 183

19 Thijs, A (1957) Considération sur les tumeurs malignes des indigènes du Congo Belge et du Ruanda Urundi *Ann Soc belge Méd trop* 37, 483

20 Raper, A B, Elmes, B G T & Musoke, L K (1952) Cancer of the lung in Africans *E Afr med J* 29, 433

21 Gelfand, M (1957) *The Sick African*, 3rd ed p 414 Cape Town Juta

22 Chung, H-L (1957) Primary carcinoma of the liver *Chin med J* 75, 295

23 Stransky, E & Felix, N S (1951) On malignant new growths in the Philippines *J Philipp med Ass* 27, 106

24 Hou, P C & Pang, S C (1956) Chorion epithelioma *J Path Bact* 72, 95

25 Kouwenaar, W (1951) Incidence of cancer in Indonesia *Docum neerl indones Morb trop* 3, 357

26 Bersohn, J (1957) Liver function tests in primary carcinoma of the liver in South African Bantu. *S Afr med J* 31 (2), 828

27 Bolen, H L (1944) Diagnostic value of blood studies in malignancy *Amer J Surg* 63, 316

28 Thomas, E (1953) The value of Bolen's test in the diagnosis of malignancy *Indian J med Sci* 7, 487

29 Navarro, M D & Navarro, R P (1957) The Beard antrone test *J Philipp med Ass* 33, 740

27

Surgical conditions of the Respiratory Tract

BUCCO-PHARYNGEAL PATHOLOGY

AIR may pass through the nose or the mouth as it enters the lungs The extensive mucous membrane surface over which it passes in both these cavities warms the air considerably before it enters the larynx on its way to the lungs Infection is on occasions carried with the inspired air to the mucous membrane of the mouth, nose and the accessory air sinuses Pathology results in any part where infection becomes established It is in some instances the result of disease processes transported to these sites by blood-stream infections Changes in the appearances of the surfaces are in many conditions the outward manifestation of general disease, anæmia giving rise to pallor of the surfaces or avitaminosis causing changes in the texture or appearance, as noted when vitamin B or vitamin C are inadequate In some diseases the superficial layers alone are involved while in more serious conditions the associated deep structures are implicated Each race of people varies considerably in the characteristics of their features The external characteristics are usually obvious, while the internal features are less apparent though none the less quite definite

Congenital defects of the lip and palate have already been considered briefly Customary perforations of the lips and the nose seldom call for treatment

Examination of the mouth, nose and throat are greatly facilitated by the use of a dark room and adequate illumination from a head lamp An indirect source of light is often used which is then projected from a perforated head mirror Most doctors like a very bright light of the white shade to work with as they are most used to this colour, but others have found lesions are accentuated in appearance when a lamp is used which incorporates a degree of ultra-violet light This accentuates red and brings inflammatory areas into greater perspective The advantages gained by the use of one particular shade of light may be lost by its inability to show up other features Photoflood lamps made for photographic work give an excellent cold white illumination, but they burn for a relatively short time and are therefore expensive Many minor lesions are easily detected with proper illumination in a dark room which would otherwise be missed if examined by daylight A dark room is essential in hospitals for the adequate examination of patients complaining of symptoms referable to the ears, nose and throat

Wounds of the tongue are in almost all cases found in the anterior half of this structure. In almost all instances they are due to the tongue being caught between the teeth when a patient is struck on the chin during a fall or when fighting The tongue has a large blood supply and the blood loss is relatively high in proportion to the length of the wound sustained, which seldom exceeds 1 in

If the patient has not lost excess of blood and is not bleeding actively when first seen and the blood-pressure is adequately maintained, the wound should be sutured under intravenous barbiturate anæsthesia Time should be allowed for the patient to empty the stomach, two or three hours being necessary in some cases Intravenous anæsthesia has the advantage that the operator is not hampered by anæsthetic apparatus about the mouth during the operation The procedure takes only a few minutes The tongue wound should be cleaned gently so that hæmorrhage is not again started Not more than three chromic catgut sutures of fine calibre 000 should be applied The sutures should go through the deep tissues to approximate the depths of the wound and then back again through the immediate mucous membrane edge of the wound, so that the edges are accurately opposed This ensures a smooth tongue surface after healing is complete One dose of long-acting penicillin is then given to decrease the risk of spreading infection The mouth is kept clean with weak hypochlorite mouth washes Weak Eusol or Milton solutions are suitable Antitetanic serum is not necessary in these cases Other trauma inside the mouth usually consist of damage to the teeth, loosening them in their sockets In some instances dental injuries are associated with fracture of the jaw It is necessary to decide whether loose teeth should be removed or left alone If the apex of the tooth is not dislodged the tooth will in many cases become firm again in position If an unconscious patient is admitted to hospital having had an injury to the teeth, care must be exercised to see that a displaced tooth has not been inspired into the trachea inadvertently It is desirable in such cases to undertake a chest X-ray examination to determine this as soon as possible

Rice and fish are common items of diet in many parts of the tropical world and in areas where these constitute the basic diet swallowing of fish bones is very common Patients are constantly being brought to hospital complaining of having a fish bone stuck in the throat The usual position for a small fish bone to stick when swallowed with food is in the throat about 1 cm below the base of the tonsil on either side It is usually slightly posterior to the tonsil position In most instances the patient can put a finger on the outside of the neck in a position corresponding very accurately to the site of the impacted bone inside the throat In about 50 per cent of patients who complain of a fish bone being stuck in the throat, it is found that there is no bone present, but there is in these cases a wound of the mucous membrane corresponding to the site where the patient thinks the bone is placed Large fish bones stick more frequently in the œsophagus An X-ray examination will not reveal small fish bones in the throat, but larger strong bones can often be detected by this means The photographs should be taken in both planes, not just one In a high proportion of cases where a bone in the throat is complained of, it is possible to feel the bone if a finger is gently inserted through the mouth into the throat Care is necessary not to force the bone farther into the mucous membrane Where a bone is detected by direct palpation or seen on X-ray examination, the patient should be given a general anæsthetic, having allowed sufficient time for the stomach to empty, and an examination carried out under direct vision using a Macintosh's laryngoscope A crocodile forceps of sufficient length—10 in —is employed for the removal of the bone In some cases it

is advisable to carry out an examination under anæsthesia *even though the bone is not* palpable or seen on radiology Local anæsthesia is not satisfactory to the patient or the doctor for the removal of foreign bodies from the mucous membrane of the pharynx In other cases there is obvious hæmorrhage within the mucous membrane and it is necessary to feel for the bone with the end of the forceps In some cases *the bone can be felt* easily even if not seen, sometimes it is neither felt nor seen When the patient is under an anæsthetic the traumatised area can again be examined with the ungloved finger *if necessary to locate it accurately, if it is* within reach In most patients in the tropics who have a dark complexion, the inside of the mouth is the same colour as that noted in patients in Europe Amongst some peoples in Africa and elsewhere tattooing of the gums in a dark shade is customary Pigmentation of the gums occurs naturally in some patients Pigmentation is in other cases due to pathology elsewhere in the body It may be associated with chronic gastritis, this is more common in women than men Pigmentation of the *inside of the mouth is seen in people of white* races who *have had* an illness associated with pathology of the suprarenal gland Such pigmentation was originally described by Still in connection with rheumatoid arthritis in childhood, there is usually leucopenia present and a degree of thrombocytopenia present also Pigmentation inside the mouth also occurs in some purpuric conditions In Addison's disease due to tuberculosis of the adrenal gland, there is a typical triad of signs, namely—pigmentation of the skin and mucous membranes, vomiting and low blood pressure

The condition seen in African patients termed "onyalia" is rare but characteristic There are bulbous hæmorrhagic blisters on the inside of the cheeks and tongue There is a general hæmorrhagic tendency present causing bleeding from the gums, nose and intestinal tract This condition is also associated with a marked degree of anæmia and thrombocytopenia The hæmorrhagic patches on the lateral surfaces of the tongue look rather angiomatous in appearance and may cause confusion in diagnosis *If the condition is suspected, a full blood count* examination should be undertaken This should include a platelet count which is invariably below normal Blood transfusion is beneficial in treatment One case of onyalia seen personally in West Africa had severe epistaxis on three occasions After discharge from hospital he became acutely depressed and committed suicide by drowning In any condition where there is evidence of hypersplenism there is an undue destruction of blood cell elements If it can be found from bone marrow studies that *blood formation is normal and yet the circulating number* of platelets is unduly *low*, it can be concluded that the spleen is abnormally active removing blood cells of all sorts too rapidly Removal of the spleen should be considered Cortisone has been used in the treatment of thrombocytopenia, but with limited success Recently three or four cases of onyalia have been reported from Portuguese West Africa When the hæmorrhagic blisters about the tongue rupture, they leave a painful ulcer This heals slowly

Perforations of the hard palate (Fig 286) are invariably associated with disease of the nasal cavity, the cartilage is in most cases involved Yaws is the most usual cause of this condition in tropical countries Syphilis is a less common factor Rhinoscleroma produces this effect in some instances Patients request treatment

most often for the condition causing the perforation because of associated discharges but seldom do they come because of the perforation itself T
to remember in deal
to close a p
has been g this is not appreciated and a premature operation is attempted the perforation will certainly be made worse

Unhealthy softening of the gums is associated with avitaminosis C In cases of avitaminosis B there is a marked tendency towards soreness of the tongue with fissure formation on the surface and about the angles of the mouth In male patients there is frequently soreness of the skin of the scrotum of an eczematous type The patient is improved by the administration of large doses of vitamin B *From personal observation it seems that juvenile patients suffering from this*



FIG 286
Perforations of the palate secondary to an old yaws infection

condition are equally improved by the administration of worm medicine for ankylostomiasis It is likely that there is not a deficiency of vitamin B in the diet otherwise there seems no reason why other members of the community should not also suffer from this condition It is probabl
ankylost
of vita
the co

A state of the mouth is sometimes secondary to carious teeth Adequate dental hygiene and removal of carious teeth improves the condition Dental fillings in less advanced cases may suffice Patients who suffer from dental *sepsis usually* show spirochætes on examination of discharges *from about the* gums Vincent's angina is a form of sore throat with pharyngeal ulceration seen most often about the tonsils and spreading on to the gums Large numbers of spirochætes and fusiform bacilli are found in the lesions This condition is seen much more frequently in the tropics than in temperate areas of the world The ulceration is of a shallow spreading type and there is pyrexia In some cases an extensive area is involved by the ulceration The condition is very painful It

is rapidly improved by the use of intravenous norvarsenobenzol or alternatively penicillin in adequate doses Local mouth washes are also an advantage The organisms of Vincent's angina are highly infectious and spread from patient to patient if in close contact

Inability to open the mouth widely is characteristic of tetanus Trismus is also caused in some instances by an impacted third molar tooth, it is also associated with osteomyelitis of the jaw secondary to dental sepsis about the molar teeth If a jaw sequestrum forms in the bone adjacent to the angle of the jaw the masseter muscle frequently becomes involved in the inflammatory condition This is a serious complication The muscle tissue is damaged and replaced by fibrous tissue over part of its extent In these cases there may be permanent disability the patient not being able to open the mouth properly In some patients seen in the tropics inability to open the mouth is associated with an inflammatory condition affecting the temporal muscle There is sometimes a deposition of calcium in the muscle rather like a myositis ossificans This is a most serious condition and very difficult to treat, if not impossible If extensive fibrosis occurs in either of these muscles on one side and the condition cannot be rectified by conservative means, it is necessary to divide the attachment of the infected muscle from the jaw The jaw action can be maintained moderately well by the other muscles of mastication Temporary difficulty in opening the mouth is sometimes caused by tetany This condition is associated with low blood calcium It is seen on rare occasions for a few days following sub-total thyroidectomy and it improves spontaneously, but improvement is accelerated by the administration of intravenous calcium gluconate, 5 c c of 10 per cent solution It is a well-known complication of sprue and adult cœliac disease Sprue is seldom seen in Africa but may be noted in patients who originally contracted the disease in India or other parts of Asia Trismus is a well recognised complication of bee stings Trismus is also a clinical feature in eel meat poisoning and stings by poisonous fish in tropical waters

Small acute painful ulcers occur about the inner surfaces of the lips and cheek at intervals in patients who persistently suffer from chronic gastric conditions The acute pain of the ulcers can be best relieved by the application of a crystal of potassium bichromate or stick silver nitrate carefully applied to the immediate area of the ulcer A moist saline swab is then applied to remove the excess of the application so that healthy parts are not injured by it Following such treatment which is momentarily painful these minute ulcers heal quite quickly Attention should be given to the treatment of the underlying gastric condition which has probably precipitated them

The opening of the parotid duct can be seen as a minute elevation on each side of the cheeks adjacent to the first molar teeth In cases of acute parotitis there is conspicuous reddening about the orifice of the duct Chronic enlargement of the parotid glands of a painless nature is frequently seen in African patients, the patients have no symptoms The swelling may remain for months or years

Koplik's spots are white spots seen on the inner aspects of the cheek of patients with measles, very rarely seen in European patients, but quite often in African patients

Although renal stones are rare in African patients salivary calculi are comparatively common They occur more often in the submaxillary ducts than the parotid ducts Stones of this type can usually be felt without difficulty by placing one finger over the painful area in the mouth and another finger on the outside of the neck or on the cheek depending on which duct is involved The stone shows easily on X-ray examination The condition is best dealt with by making a small opening over the stone inside the mouth and removing it using local anæsthesia

A ranula is a cyst of a mucous gland in the sublingual position In patients in the tropics who frequently neglect this condition as it is not very painful, the cyst increases in size until ultimately a conspicuous swelling develops beneath the lower jaw In some instances it reaches as far back as the anterior edge of the sternomastoid muscle The usual advice given is to dissect out the cyst complete without rupturing it This is very satisfactory if it can be achieved, and this has been successfully undertaken personally on many occasions If the cyst ruptures during the dissection it is extremely difficult, if not impossible in some cases, to remove the wall of the cyst in its collapsed state, as it is very thin If this happens the cyst usually recurs and a further attempt to remove it must be made later after a lapse of several months In one case the cyst entered the tissues in the middle of the tongue The tongue became enormously enlarged giving the appearance of an acute glossitis The patient could close the mouth only with some difficulty It was found that the condition had been present for over a year, becoming progressively worse and recently making feeding difficult The whole centre of the tongue was now occupied by the cyst which was quite apparent *beneath the surface of the mucous membrane In this case the centre of the* tongue was divided carefully without rupturing the cyst and the complete cyst was removed in one piece undamaged without undue difficulty The operation was undertaken using local anæsthesia because of the difficulty in either introducing an endotracheal tube or giving an anæsthetic without one Local anæsthesia was therefore considered safest. Following removal of the cyst the two sides of the tongue were approximated and the patient made an uneventful recovery Because of the risk of rupturing a ranula in attempting to remove it, it is advised that the method of Danna [1] be used as advised elsewhere for the marsupialisation of sebaceous and other cysts A non cutting needle is inserted into the cyst at the position where it is desired to make a new duct into it The needle, being properly placed, is then gripped in an artery forceps and to the artery forceps a diathermy needle is applied so by diathermy making a new opening into the cyst By this means virtually a new duct of large calibre is formed so draining the cyst and allowing the wall to contract down to normal proportions The diathermy burning a hole in the covering mucous membrane and the underlying cyst wall forms a new duct as these two layers unite along their respective circular openings on healing This operation is simple, safe and can be undertaken for out patients, as it does not necessitate hospitalisation If no diathermy apparatus is available in a country station, a similar opening can be made with an actual cautery using a strong wire, this has been used personally on a few occasions in country stations and it works excellently It is necessary to give the patient an intravenous anæsthetic

as general anæsthesia would be dangerous while working about the mouth because of the risk of an explosion A dental prop between the molar teeth prevents closure of the mouth during the operation

Helman[2] comments on the frequency of carcinoma of the tongue in women in South-West Africa This condition is associated with smoking trumpet-like metal tobacco pipes This form of pipe becomes very hot when smoked, damaging the epithelium of the inside of the lips and tongue As opposed to this, the men smoke ebonite pipes and do not develop carcinoma of the mouth The ebonite is a non-conductor of heat and so does not burn the lips or tongue Carcinoma of the lower lip and the tongue was more common in Europe when clay pipes were smoked more frequently than in recent years In many cases the brittle stem of the pipe broke off and the remaining broken pipe was smoked The short stem became very hot close to the bowl containing the burning tobacco Alexander[3] with experience of medical work in West Africa and Malaya, notes that malignant disease of the mouth and pharynx is much more common in Malaya than in West Africa The same is true of carcinoma of the lung which is exceptionally rare in West Africa, but more common in Malaya Carcinoma of the tongue occurs most frequently as an indolent ulcer about the side of the structure in its posterior two-thirds It is less often seen about the tip of the tongue, whereas tuberculous ulceration occurs more often in the anterior third In all cases of ulceration of the tongue which do not heal within two weeks, it is advisable to undertake a biopsy examination in order to ascertain the nature of the pathology as soon as possible Conditions initially thought to be malignant are sometimes found on section to be due to fungoid infections Histoplasmosis of the tongue and pharynx

gives rise to an irregular granulomatous condition about the face and lips The inside of the lips, tongue and pharynx are sometimes involved It may easily be mistaken for malignant disease The condition has been recognised most often in South America, but with other comparable fungoid conditions found over a wider area of the world any form of fungoid disease must be considered in pathology about the mouth or the tongue Actinomycosis of the tongue is also recognised though it is rare Monilia is a fungus condition though much less serious than histoplasmosis It occurs frequently in the mouth in the form of thrush in infants In recent years moniliasis of the mouth and all parts of the intestinal tract has become more common with the free use of antibiotic drugs which decrease the normal intestinal bacterial flora predisposing to the increase of fungus growths

On rare occasions a completely painless tumour is found centrally placed in the posterior third of the tongue This mass is in most cases found quite incidentally as it causes no symptoms The patient states that the mass has always been present If such a history is given, it may be taken that the condition is most probably due to aberrant thyroid tissue The thyroid gland normally forms in the posterior third of the tongue in embryonic life before descending to the normal pretracheal site in the neck In rare instances the thyroid tissue does not descend, but remains in this primitive position The history that the swelling was "always there"

suggests the true nature of the mass It should be left alone In some cases the patient has no other thyroid tissue present elsewhere If the mass is excised it would give rise to serious consequences to metabolism, apart from the risk of infection

A peritonsillar abscess produces pus within the substances of the tonsil The maximum swelling usually occurs a little lateral to the anterior pillar of the fauces in its upper half When this condition occurs the patient should be given an initial dose of penicillin and eight or ten hours later the abscess should be opened with a "guarded knife," adhesive plaster being wrapped round the proximal three-quarters of the blade, leaving only the distal quarter exposed This minimises the risk of damaging the lip as the knife is withdrawn after incision of the abscess To anæsthetise the surface of the swelling it should be painted with a damp swab dipped in powdered cocaine If the condition is opened quickly under local anæsthetic only, the patient is able to spit out the pus and wash out the mouth immediately In this way the risk of aspirating pus is minimised and the procedure is safer than when the operation is carried out under general anæsthesia

In tropical climates hypertrophy of the tonsillar tissue is much less frequently seen than in damp cold climates, as noted in Europe Tonsillar enlargement is much less marked in children in Africa than young people in Europe Tonsillectomy is, therefore, not frequently required Removal of tonsils is sometimes desirable if a patient gets a recurrence of a peritonsillar abscess or repeated sore throats In children in Europe the method of removal of tonsils by the application of the tonsil guillotine is widely practised The method is quick and the results are good in about 90 per cent of the cases The method is personally considered unsuitable for African children and this for the following reason In European children the tonsils enlarge at an early age and assume a marble-like shape with a narrow base, so that the guillotine fits over them accurately and they can, in most cases, be pressed through the ring of the instrument using a finger to exert gentle pressure on the outside of the neck on the side being dealt with When the instrument is closed and rotated the complete tonsil is removed in most cases As opposed to this in African children, the tonsil usually enlarges more slowly and the shape of the tonsil is quite different being much broader at the base and firmly fixed to the lateral wall of the pharynx, while the shape of the tonsil is more like a mountain, broad base—narrow top For this reason the guillotine cannot be put over the complete tonsil and any attempt to remove it with this instrument is liable to cut the top off the tonsil but not remove it completely It is therefore advised that where this type of tonsil is encountered a guillotine should not be used but tonsil dissection employed Tonsil dissection is more time-consuming than removal with a guillotine, but as African tonsils are seldom suitable for removal by this instrument and only a small number of tonsils require removal the time factor is of little importance and by using tonsil dissection the results are more satisfactory Where a trained anæsthetist is in attendance an endotracheal anæsthetic is admirable for the purpose of removal of tonsils In the absence of a trained anæsthetist removal of tonsils in adults can be undertaken very satisfactorily using intravenous pentothal followed by injection of weak local anæsthetic ½ per cent novocain with a very small amount of adrenaline solution added, 5 minims added to 100 c c

of novocain The dose of adrenaline should not exceed that stated *Injection of* fluid into the base of the tonsil elevates it thus facilitating separation of the tonsil from its bed It also decreases the risk of hæmorrhage The pentothal lowers the blood-pressure slightly and so hæmorrhage is minimised A suction tube placed in the mouth during the operation is more suitable for the removal of blood than the use of swabs on forceps In this way the dissection is not hampered An angled Negus tonsil dissection knife is most suitable for the purpose of separating the tonsil pillars from the tonsillar tissue In all instances the tonsil pillars should be pushed away from the tonsil, which is gripped in a special tonsil holding forceps, rather than make an attempt to pull the tonsil off the side wall of the pharynx, which is wrong The injection of the local anæsthetic is best made using a Krause's needle This 6-in needle was originally made for injection of local anæsthetic into the cœliac ganglion for the purpose of local anæsthesia in abdominal surgery The needle has a fine gauge in its distal ½-in while the remainder of the needle is of much thicker calibre so that it does not bend easily The needle fits on to a standard record syringe, and the tonsil bed can be injected without the hand coming close to the front teeth It is an admirable injection needle for use during tonsil operations

In examining the larynx by the indirect method the mirror must be well warmed to avoid fogging as the patient breathes on it The patient's throat should be sprayed with 5 per cent cocaine solution before the examination To see the larynx properly a dark room must be used and a good source of illumination be available A better view is obtained if a moderately large laryngeal mirror is used rather than a very small one If the patient's fauces are adequately anæsthetised by the spray there is no greater difficulty using a large mirror than a small one, and with a large mirror pathology is better appreciated Patients vary greatly in their ability to remain quiet and breathe slowly and gently during laryngeal examination It is much easier for the patient to have the tongue held in a gauze swab during the examination than having it displaced with a spatula If patients find it difficult having the larynx examined, it is an advantage to give them a tablet of soneryl half an hour before the examination If soneryl is given the patient should rest on a trolley before the examination and for some time afterwards, otherwise he may feel dizzy with the sedative given

If the cords cannot be seen quite clearly and distinctly, it is advisable to examine the larynx under a general anæsthetic after adequate preparation, so that the area can be seen under direct vision A Macintosh's laryngoscope or a Magill instrument are both suitable for direct laryngeal examinations One of the advantages of examination of the larynx under local anæsthetic is that the movement of the cords can be ascertained accurately when the patient makes appropriate sounds As well as the action of the cords being noted, the presence of ulceration, or growth should be looked for Stenosis about the cords or adhesions between them at some part is seen where long standing ulceration has existed in the past and has now become quiescent This happens in some cases of yaws and is a feature of quiescent rhinoscleroma also—the nasal cartilages, the larynx and the trachea all being affected in cases of rhinoscleroma

Cases of laryngeal stenosis due to old yaws conditions are very difficult to relieve by operations attempted through endoscopic instruments Having tried to deal with cases by this route, it has been found that the difficulty caused by bleeding and the limited space afforded makes it much wiser in such cases to undertake a preliminary tracheotomy and two or three weeks later open the larynx by a direct approach (laryngofissure) so that a piece of tissue can be systematically removed to clear the airway Hæmorrhage can be adequately controlled also The tracheotomy safeguards the immediate post-operative airway These patients already have irreparably damaged vocal cords, but if the airway is cleared they learn to speak moderately well in a low voice which is quite intelligible This type of condition is less likely to be seen often in the future because of the beneficial effects of penicillin, which is so effective in the treatment of early yaws Adequate treatment forestalls the late complications which in the past caused much disfigurement and disability

NASAL CAVITY AND ACCESSORY SINUSES

Nose bleeding is a comparatively common condition in people in all parts of the world Adequate examination is necessary to determine its cause In some instances it is due to trauma, the cause is given with the history Epistaxis has been attributed to helminthic infections, but it is difficult to correlate these two conditions Hæmophylia is a rare condition, but bleeding from the nose is sometimes associated with it This condition is seen sometimes in African patients Many blood disorders have a hæmorrhagic diathesis associated with them This is particularly the case in any condition with thrombocytopenia present Purpura of all sorts show this tendency The condition of onyalia seen occasionally in African patients is of this nature, and such patients complaining of nose bleeding should have the mucous membrane of the mouth examined to see if there are any of the hæmorrhagic blisters characteristic of this disease present about the inside of the mouth Bleeding from a telangiectatic patch on the lower part of the nasal septum (Little's area) is rare The condition gives rise to recurrent bleeding It is best dealt with by the application of the diathermy cautery during a quiescent period It is important to estimate the blood-pressure in all cases of nose bleeding Hyperpiesis, although more common in patients over the age of 50 years, is also seen in patients in the younger age groups A high blood-pressure is not uncommon in quite young African patients in West Africa

Any form of ulceration inside the nasal cavity is liable to cause nose bleeding as a result of secondary hæmorrhage The ulceration is sometimes due to the presence of a foreign body impacted in the nose , the patient in most cases has a nasal discharge of several days' or weeks' duration, the implicated side only being involved Young children cannot give an accurate history of their condition Associated with intranasal ulceration there is an offensive smell from the expired air coming through the nose Intranasal examinations should be undertaken in a dark room with adequate electric illumination projected through appropriate instruments It is necessary to use a well fitting intranasal speculum

Nasal polypi are seen as opalescent globular masses with a smooth surface They are attached to the lateral and superior aspect of the nasal cavities in most cases They often reach enormous sizes causing complete obstruction on the side implicated Nasal polypi due to rhinosporidiosis have a slightly yellowish colour, they are not white The surface is corrugated rather than smooth This is a fungoid condition which is seen most frequently in Southern Asia, India, Ceylon and Malaya The condition is not common Removal of nasal polypi is undertaken by the use of a nasal snare The wire loop is inserted into the nostril and passed beneath the base of the mass As the loop is brought up to the point of attachment of the polypus it is tightened so that the polypus is gripped close to its base on the nasal wall Polypi are very liable to recur following removal

Children frequently insert foreign bodies into the nose and the ears Many of these are found to be not opaque on X-ray examination In most cases it is advisable to give a general anæsthetic before removal of foreign bodies from the nose or ear in children This decreases the risk of trauma and is better for both the patient and the doctor A Gardiner-Brown aural curette and hook is an admirable instrument for removal of foreign bodies from either of these sites It passes the foreign body easily and by depressing the handle the smooth vectis-like end withdraws the foreign body

Because of the relatively wide nasal cavities in patients in many parts of the tropics, obstruction due to enlargement of the inferior turbinate bone is rare Marked deviation of the nasal septum is also less common than in patients with the narrow type of face and high nasal bridge with narrow air passages Removal of an inferior turbinate bone is, however, sometimes called for if there is marked hypertrophy present causing nasal obstruction The easiest method of undertaking this operation for those with limited experience is to anæsthetise the patient and apply a 7 in Spencer-Wells artery forceps along the whole length of the lower protruding part of the turbinate bone to be removed Holding the applied forceps in the left hand the turbinate bone is then cut off with a narrow pair of scissors angled on the flat The bone is cut lateral to the forceps applied The forceps act as an excellent guide and an accurate straight cut is made The detached piece of turbinate is then withdrawn in the blades of the forceps which hold it Packing the nasal cavity before the operation with a gauze strip soaked in adrenaline solution decreases the risk of bleeding following the operation The application of iced packs to the face and neck after the operation also reduces hæmorrhage, which is seldom severe

Removal of an enlarged turbinate bone is sometimes helpful to patients who suffer from recurrent hay fever or asthma These latter two conditions are both very common in the tropics particularly during the mid-rainy season when the grass is long and flowering Recurrent allergic rhinitis is common in European patients in the tropics, it is also seen in indigenous persons but less frequently In no case have patients been seen in the tropics where indigenous patients have requ

occa

view to bringing them together as they affect this anatomical site

affecting the nose with extensive ulceration is seen most frequently in South America The terms "espundia" and "forest yaws" have been applied to the condition in error The nature of the pathology is confirmed by microscopic section of tissue removed from these lesions In patients with early leprosy, infection of the nasal mucous membrane is present in a high proportion of the cases Examination of nasal mucus is useful as a method of detecting the disease Leprosy bacilli can be found in mucus blown from the nose on a swab and positive

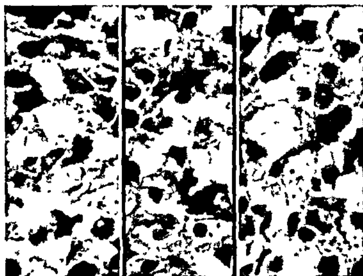


FIG 287

Micro section of rhinoscleroma granulation tissue showing Mikulicz cells containing bacilli

By kind permission of the Elsevier Publishing Co Amsterdam, and the Editor of *Tropical and Geographical Medicine* Case of Dr J D Vervoorn and Dr H de Jager

results on microscopy are equally high as when scrapings or smears are taken from the nose with some discomfort to the patient

Nasal swabs for meningococci are sometimes taken during times of meningitis epidemics to detect those carrying meningococci even though they have no evidence of cerebral symptoms Nasal swabs are sometimes used to detect diphtheria carriers, but diphtheria is rare in the tropics Tuberculosis of the nasal cartilages is uncommon and if found is almost certainly associated with pulmonary tuberculosis Yaws more frequently affect the nasal cartilages in neglected cases It gives rise to initial thickening of the cartilages and later ulceration and destructive changes A perforation of the nasal septum is sometimes due to this cause and in other instances there is a perforation of the hard palate causing a communication between the nose and the mouth cavities (Fig 286) In some cases there is gross disfigurement of the face with loss of the nose

Rhinoscleroma is an infective granulomatous condition attacking the nasal cartilages, the cartilages of the larynx and the trachea There is initial thickening and ulceration present in the nose Granulation tissue protrudes from the nostrils and there is gross thickening of the upper lip due to the associated inflammation Thickening of the laryngeal cartilages and the trachea causes late complications with stenosis of the air passages The condition was comparatively common in Southern Russia prior to 1920 but it is now rare It is still seen frequently in the Celebes Islands of Indonesia It has also been reported from many parts of Africa in small numbers Vervoorn [4] has recently made a contribution to the literature on this subject from Ghana The condition is due to infection with a Gram negative diplobacillus of Von Frisch The characteristic organisms can be found in the secretions from the lesion and on tissue section of material removed for biopsy (Fig 287) The disease seems to be self-limiting, but may cause much disfigurement and ill health during the active stage The death-rate for this disease is very low The condition being of an infective nature may affect several persons in the same family where hygienic conditions are poor Treatment with streptomycin and tetracycline antibiotic drugs has given promising results



Fig 288

Frontal sinusitis with pus discharging *from a fistula*

Blastomycosis is a fungoid condition which typically implicates the tissues of the face, particularly adjacent to the mouth, and in some cases the inside of the mouth and nose are affected The patient suffers from a tumour-like mass of a warty character on the face Inside the mouth the lesions are granulomatous in type The condition is seen most often in South America Methods of treatment of fungoid conditions have been discussed in Chapter 18 Cases of histoplasmosis affecting the nose and throat have also been reported Rhinosporidiosis also belongs to the fungoid conditions

Inflammation of the accessory air sinuses is frequently seen in African patients Infection of the frontal sinus is more usual than sinusitis of the maxillary antrum or the mastoid air cells If frontal sinusitis is not recognised at the early stage of the disease, pus ultimately breaks through the sinus wall and comes to the surface over the sinus or beneath the superciliary ridge of the affected side (Fig 288) A chronic discharge results with distortion of the local tissues Patients with frontal sinus infection complain of chronic headaches over the frontal area There is tenderness on pressure over the affected area X-ray examination is helpful in confirming the diagnosis Transillumination carried out in a dark room is of some value and is useful in diagnosis in hospitals where X ray facilities are not available In some chronic cases there is marked downward displacement of the eye below the affected sinus The sinus expands as seen in Fig 289

There are several approaches described for operations on the frontal sinus The incision considered most satisfactory and simple is that which runs through

the eyebrow position in its complete length Keloid formation does not occur following incisions above the eye level Attempts to evacuate pus from the frontal sinus by the transnasal route are unsatisfactory An incision placed on the side of the nose adjacent to the inner canthus of the eye does not give adequate access to the frontal sinus and so is not recommended Frontal sinus operations can be undertaken under local or general anæsthesia Appropriate preliminary sedation is necessary for the type of anæsthetic used

Where general anæsthesia is used it is advisable to introduce a solution of 1 in 200,000 adrenaline in water into the tissues along the line of the incision and in the forehead area, this decreases bleeding during the operation The supra-orbital incision is made down to the bone, cutting the periosteum The superficial tissues



FIG 289



FIG 290

Fig 289—Frontal sinus expansion with downward displacement of the right eye
Fig 290—Same patient as in Fig 289 following sinus operation with Naffziger modification

are then displaced and hæmorrhage arrested A self-retaining retractor is inserted With a small gouge an entrance is made into the sinus At this stage pus usually emerges, confirming the diagnosis The opening in the bone is then enlarged with a Citelli's biting forceps The opening made should be about 2 cm wide and more or less circular This is sufficient in most instances to permit of complete stripping of the mucous membrane of the sinus If local anæsthetic is used for the operation it is difficult to reduce the discomfort felt when removing mucous membrane in the area of the fronto nasal duct Mucous membrane from this area must be removed very carefully and gently If the sinus contains septa of bone going into it from its lateral walls these should be removed so that ultimately a discrete cavity is visible from which all mucous membrane is removed A Negus tonsil dissection knife and a Kocker's dissector are useful instruments for stripping the mucous membrane from the wall of the sinus

To complete the operation the fronto-nasal duct is enlarged This is best undertaken by inserting the blades of a closed 5 in Spencer-Wells artery forceps

through the sinus down into the nose and rotating it This enlarges the channel considerably allowing of adequate drainage It is not necessary to put any drainage tube into the nose through the enlarged duct Penicillin is given following the operation During the operation it may be seen in some cases that the ethmoid air cells adjacent to the fronto-nasal duct are affected with pus coming from them If this is the case the nearby ethmoid air cells should be curetted-out, but this is seldom necessary In cases where there is downward displacement of the eye due to expansion of the sinus, the eye will remain displaced following the operation unless the supra-orbital plate is removed to allow the eye to return to its proper position To achieve this the supra-orbital plate is removed over almost its entire area whereupon the proper position of the eye is restored This operation is the same as the Naffziger procedure for exophthalmos (Fig 290) The supra-orbital incision, closed with nylon sutures (Fig 291), invariably heals by primary union in spite of the sepsis present in the sinus before operation The frontal sinus contains either pure pus, clear fluid with lecithin like crystals in it, or in others a mass of thick sticky mucus under pressure



FIG 291
Patient showing frontal sinus operation incision closed with nylon sutures

Operations for chronic maxillary sinusitis are less frequently required for inflammatory conditions than in the frontal sinus disease Unfortunately, the maxillary sinus is frequently implicated by malignant disease in both children and adults The standard approach to the maxillary antrum is through the upper buccal sulcus over the position of the lateral incisor tooth (Caldwell-Luc operation) Adrenaline in water 1 in 200,000 solution is injected into the soft tissues to minimise the bleeding A cheek retractor improves visualisation After raising the periosteum off the surface of the bone above the teeth of the maxilla a small opening is made in the bone with a gouge and this is enlarged with a Citelli's forceps so that an opening of about 2 cm in diameter is made in the wall of the sinus Through this opening the mucous membrane of the maxillary sinus is removed completely After removal of the mucous membrane an accessory opening into the sinus is made from the nose A wide-bore trocar and cannula can be employed for this purpose once the opening is accurately placed, it can be enlarged if necessary from the inner side under direct vision The opening is made at the level of the floor of the nasal cavity and corresponds also to the most dependent position of the maxillary sinus This opening permits of dependent drainage If the opening is adequate in size it remains patent It is usual to insert a small pack through the nose for forty-eight hours after the operation, this helps to absorb serum in the maxillary cavity

Infection in the mastoid air cells following spread of infection from the nasopharynx via the Eustachian tube and the middle ear is approached through an incision behind the pinna of the ear Mastoid infections in African patients are seen most often in young children In many cases these children are brought to hospital with a fully developed abscess in the soft tissues over the mastoid process (Bezold s abscess) The tip of the mastoid processes in young children is cartilage only If seen at this stage the condition is best treated by incision only In many instances the condition settles down and no recurrence of the inflammation is seen Penicillin is beneficial in treatment In adult patients the abscess seldom ruptures on the surface and there is a higher risk of complications than in infants A cortical mastoid operation of the Schwartzer type is usually called for

Those with limited experience look on mastoid operations with apprehension, fearing damage to the facial nerve This accident is most unlikely to occur if the cortical operation only is undertaken and it rarely follows radical mastoid surgery As a guide to the mastoid air cells the suprameatal triangle should be identified After the initial incision has been made through the soft tissues and through the periosteum over the mastoid process the tissues are elevated from the bone with a periosteal elevator A self-retaining retractor is inserted into the wound The suprameatal triangle is then identified and an opening made into it carefully with a gouge and hammer

Soon after arriving at a country hospital a case of acute mastoiditis was seen and operation was arranged, but it was found after the operation had been started that there were no mastoid chisels in the hospital To circumvent this difficulty a small sized trephine was used and a circle of bone removed which was centred over the suprameatal triangle and this instrument worked admirably The diseased area was entered without difficulty and pus exuded from the circular trephine opening The circle of bone was elevated and the cavity was enlarged using an ordinary straight bone chisel The patient made an uneventful recovery These circumstances illustrate the difficulties that may be encountered in small hospitals where specialised operations are seldom undertaken This, though not an ideal method, is a very practical one and very safe for those with limited experience In using mastoid chisels an adequate grip should be maintained and the hand steadied either on the patient's head or against the operator's own side about the position of the lower ribs If a radical mastoid operation is undertaken adequate care must be taken to safeguard the facial nerve Stakie's guide is an instrument specially designed for this purpose Complications secondary to mastoiditis are much more common in European patients than in African patients—brain abscess and cavernous sinus thrombosis being exceptionally rare in the latter

Children are frequently seen with foreign bodies in the external auditory meatus It is advisable to give a general anæsthetic for their removal if the patient is under the age of 10 years If they are close to the surface and not tightly impacted they can be removed in some cases by syringing the ear with warm alkaline solutions The Gardiner-Brown aural curette and hook is the most suitable instrument for removing foreign bodies from the ear This instrument should be available in all hospitals

through the sinus down into the nose and rotating it This enlarges the channel considerably allowing of adequate drainage It is not necessary to put any drainage tube into the nose through the enlarged duct Penicillin is given following the operation During the operation it may be seen in some cases that the ethmoid air cells adjacent to the fronto-nasal duct are affected with pus coming from them If this is the case the nearby ethmoid air cells should be curetted-out, but this is seldom necessary In cases where there is downward displacement of the eye due to expansion of the sinus, the eye will remain displaced following the operation unless the supra-orbital plate is removed to allow the eye to return to its proper position To achieve this the supra-orbital plate is removed over almost its entire area whereupon the proper position of the eye is restored This operation is the same as the Naffziger procedure for exophthalmos (Fig 290) The supra-orbital incision, closed with nylon sutures (Fig 291), invariably heals by primary union in spite of the sepsis present in the sinus before operation The frontal sinus contains either pure pus, clear fluid with lecithin-like crystals in it, or in others a mass of thick sticky mucus under pressure



FIG 291
Patient showing frontal sinus operation incision closed with nylon sutures

Operations for chronic maxillary sinusitis are less frequently required for inflammatory conditions than in the frontal sinus disease *Unfortunately, the maxillary sinus is* frequently implicated by malignant disease in both children and adults The standard approach to the maxillary antrum is through the upper buccal sulcus over the position of the lateral incisor tooth (Caldwell-Luc operation) Adrenaline in water 1 in 200,000 solution is injected into the soft tissues to minimise the bleeding A cheek retractor improves visualisation After raising the periosteum off the surface of the bone above the teeth of the maxilla a small opening is made in the bone with a gouge and this is enlarged with a Citelli's forceps so that an opening of about 2 cm in diameter is made in the wall of the sinus Through this opening the mucous membrane of the maxillary sinus is removed completely After removal of the mucous membrane an accessory opening into the sinus is made from the nose A wide-bore trocar and cannula can be employed for this purpose once the opening is accurately placed, it can be enlarged if necessary from the inner side under direct vision The opening is made at the level of the floor of the nasal cavity and corresponds also to the most dependent position of the maxillary sinus This opening permits of dependent drainage If the opening is adequate in size it remains patent It is usual to insert a small pack through the nose for forty-eight hours after the operation, this helps to absorb serum in the maxillary cavity

Infection in the mastoid air cells following spread of infection from the nasopharynx via the Eustachian tube and the middle ear is approached through an incision behind the pinna of the ear Mastoid infections in African patients are seen most often in young children In many cases these children are brought to hospital with a fully developed abscess in the soft tissues over the mastoid process (Bezold s abscess) The tip of the mastoid processes in young children is cartilage only If seen at this stage the condition is best treated by incision only In many instances the condition settles down and no recurrence of the inflammation is seen Penicillin is beneficial in treatment In adult patients the abscess seldom ruptures on the surface and there is a higher risk of complications than in infants A cortical mastc [illegible]

feanr [illegible]

cortical operation only is undertaken and it rarely follows radical mastoid surgery As a guide to the mastoid air cells the suprameatal triangle should be identified After the initial incision has been made through the soft tissues and through the periosteum over the mastoid process the tissues are elevated from the bone with a periosteal elevator A self retaining retractor is inserted into the wound The suprameatal triangle is then identified and an opening made into it carefully with a gouge and hammer

Soon after arriving at a country hospital a case of acute mastoiditis was seen and operation was arranged, but it was found after the operation had been started that there were no mastoid chisels in the hospital To circumvent this difficulty a small sized trephine was used and a circle of bone removed which was centred over the suprameatal triangle and this instrument worked admirably The diseased area was entered without difficulty and pus exuded from the circular trephine opening The circle of bone was elevated and the cavity was enlarged using an ordinary straight bone chisel The patient made an uneventful recovery These circumstances illustrate the difficulties that may be encountered in small hospitals where specialised operations are seldom undertaken This though not an ideal method is a very practical one and very safe for those with limited experience In using mastoid chisels an adequate grip should be maintained and the hand steadied either on the patient s head or against the operator s own side about the position of the lower ribs If a radical mastoid operation is undertaken adequate care must be taken to safeguard the facial nerve Stakie s guide is an instrument specially designed for this purpose Complications secondary to mastoiditis are much more common in European patients than in African patients—brain abscess and cavernous sinus thrombosis being exceptionally rare in the latter

Children are frequently seen with foreign bodies in the external auditory meatus It is advisable to give a general anæsthetic for their removal if the patient is under the age of 10 years If they are close to the surface and not tightly impacted they can be removed in some cases by syringing the ear with warm alkaline solutions The Gardiner Brown aural curette and hook is the most suitable instrument for removing foreign bodies from the ear This instrument should be available in all hospitals

through the sinus down into the nose and rotating it This enlarges the channel considerably allowing of adequate drainage It is not necessary to put any drainage tube into the nose through the enlarged duct Penicillin is given following the operation During the operation it may be seen in some cases that the ethmoid air cells adjacent to the fronto-nasal duct are affected with pus coming from them If this is the case the nearby ethmoid air cells should be curetted-out, but this is seldom necessary In cases where there is downward displacement of the eye due to expansion of the sinus, the eye will remain displaced following the operation unless the supra-orbital plate is removed to allow the eye to return to its proper position To achieve this the supra orbital plate is removed over almost its entire area whereupon the proper position of the eye is restored This operation is the same as the Naffziger procedure for exophthalmos (Fig 290) The supra-orbital incision, closed with nylon sutures (Fig 291), invariably heals by primary union in spite of the sepsis present in the sinus before operation The frontal sinus contains either pure pus, clear fluid with lecithin-like crystals in it, or in others a mass of thick sticky mucus under pressure



FIG 291
Patient showing frontal sinus operation incision closed with nylon sutures

Operations for chronic maxillary sinusitis are less frequently required for inflammatory conditions than in the frontal sinus disease Unfortunately, the maxillary sinus is frequently implicated by malignant disease in both children and adults The standard approach to the maxillary antrum is through the upper buccal sulcus over the position of the lateral incisor tooth (Caldwell Luc operation) Adrenaline in water 1 in 200,000 solution is injected into the soft tissues to minimise the bleeding A cheek retractor improves visualisation After raising the periosteum off the surface of the bone above the teeth of the maxilla a small opening is made in the bone with a gouge and this is enlarged with a Citelli's forceps so that an opening of about 2 cm in diameter is made in the wall of the sinus Through this opening the mucous membrane of the maxillary sinus is removed completely After removal of the mucous membrane an accessory opening into the sinus is made from the nose A wide-bore trocar and cannula can be employed for this purpose once the opening is accurately placed, it can be enlarged if necessary from the inner side under direct vision The opening is made at the level of the floor of the nasal cavity and corresponds also to the most dependent position of the maxillary sinus This opening permits of dependent drainage If the opening is adequate in size it remains patent It is usual to insert a small pack through the nose for forty-eight hours after the operation, this helps to absorb serum in the maxillary cavity

Infection in the mastoid air cells following spread of infection from the nasopharynx via the Eustachian tube and the middle ear is approached through an incision behind the pinna of the ear Mastoid infections in African patients are seen most often in young children In many cases these children are brought to hospital with a fully developed abscess in the soft tissues over the mastoid process (Bezold s abscess) The tip of the mastoid processes in young children is cartilage only If seen at this stage the condition is best treated by incision only In many instances the condition settles down and no recurrence of the inflammation is seen Penicillin is beneficial in treatment In adult patients the abscess seldom ruptures on the surface and there is a higher risk of complications than in infants A cortical mastoid operation of the Schwartzer type is usually called for

Those with limited experience look on mastoid operations with apprehension, fearing damage to the facial nerve This accident is most unlikely to occur if the cortical operation only is undertaken and it rarely follows radical mastoid surgery As a guide to the mastoid air cells the suprameatal triangle should be identified After the initial incision has been made through the soft tissues and through the periosteum over the mastoid process the tissues are elevated from the bone with a periosteal elevator A self-retaining retractor is inserted into the wound The suprameatal triangle is then identified and an opening made into it carefully with a gouge and hammer

Soon after arriving at a country hospital a case of acute mastoiditis was seen and operation was arranged, but it was found after the operation had been started that there were no mastoid chisels in the hospital To circumvent this difficulty a small-sized trephine was used and a circle of bone removed which was centred over the suprameatal triangle and this instrument worked admirably The diseased area was entered without difficulty and pus exuded from the circular trephine opening The circle of bone was elevated and the cavity was enlarged using an ordinary straight bone chisel The patient made an uneventful recovery These circumstances illustrate the difficulties that may be encountered in small hospitals where specialised operations are seldom undertaken This, though not an ideal method, is a very practical one and very safe for those with limited experience In using mastoid chisels an adequate grip should be maintained and the hand steadied either on the patient's head or against the operator's own side about the position of the lower ribs If a radical mastoid operation is undertaken adequate care must be taken to safeguard the facial nerve Stakie's guide is an instrument specially designed for this purpose Complications secondary to mastoiditis are much more common in European patients than in African patients—brain abscess and cavernous sinus thrombosis being exceptionally rare in the latter

Children are frequently seen with foreign bodies in the external auditory meatus It is advisable to give a general anæsthetic for their removal if the patient is under the age of 10 years If they are close to the surface and not tightly impacted they can be removed in some cases by syringing the ear with warm alkaline solutions The Gardiner-Brown aural curette and hook is the most suitable instrument for removing foreign bodies from the ear This instrument should be available in all hospitals

Otitis externa is seen in the tropics most frequently during the rainy season It is predisposed to by bathing in private freshwater swimming pools It is a source of much loss of time in working hours in European patients Fungus infections are causative of the condition in many instances Adequate cleaning of the ear by preliminary syringing with warm sodium bicarbonate solution and then *dehydration with alcohol drops* containing boric acid is useful It is an advantage to assist drying of the ear by the use of a metal tube which has a rubber bulb attached to it The tube is heated in a spirit lamp and so warm dry air is introduced A comparable method was used in the past by dental surgeons for drying out dental cavities An infant's metal mucus extractor is useful for this purpose A rubber bulb is attached to the end of the extractor and the chamber on the centre of the apparatus can be heated in a spirit lamp In this way warm dry air is produced and this dries out the ear which is otherwise difficult to dehydrate adequately This method works well Insufflation of sulpha powder is also helpful after the ear is properly dry The introduction of the sulpha drugs by mouth and the use of antibiotic substances have greatly reduced the nuisance of chronic otitis in the tropics in recent years Wax in the ears is frequently troublesome in the tropics and large quantities of it have to be removed from some patients from time to time by syringing When syringing out the ear with warm alkaline solutions the pinna should be drawn backwards and laterally, this straightens out the curve of the auditory canal Shah [5] reports on the frequency of otogenic tetanus arising as a result of ear infections The condition is relatively common in India It seems that the proportion of cases of otogenic tetanus to total tetanus encountered is about 10 per cent in India Tetanus infections from this source are of low grade usually, with a lower death-rate, it being only 50 per cent of that noted in cases of tetanus contracted from other sites

Following furunculosis and rupture of a boil into the external auditory canal a granulomatous polypus sometimes forms, this is a troublesome condition Initially the aural polypus must be removed Removal can be performed by a wire snare or curettage The condition is liable to recur if treatment is not given to eradicate the base from which it has been avulsed Following removal of an [illegible] free bleeding and it is difficult to see the base of the

with a fragment

of aural growths

by the application of oil of *Brucea javanica* If the mass is large it is removed initially by surgical means and the base then cauterised with the oil This form of treatment is not unduly painful and it causes no further trauma In the series of auditory canal warts presented by Lee forty-two cases were treated with satisfaction This method has not been tried personally, but it is attractive In some instances polypi come through perforations of the ear drum and great care is necessary in removing them not to damage the drum further The method above suggested for infective warts would appear eminently suitable for cases of this type where particular care is needed

Conditions of vertigo suggestive of disease of the internal ear are seldom seen in patients in the tropics Charters [7] describes a small outbreak of what appeared to be "epidemic vertigo" in patients in Kenya He suggested that the condition

might be due to a virus infection. This seems very probable in view of the frequency with which patients who develop smallpox recount severe dizziness as being the first symptom noticed.

INTRATHORACIC DISEASES

Food which has been well chewed does not become obstructed in a normal healthy œsophagus. Hard solid particles such as meat bones or fish bones are liable to become impacted in the gullet if they are swallowed inadvertently. Bones sufficiently solid to become impacted usually show on radiographic examination. Foreign bodies should be removed from the œsophagus as soon as possible after they are diagnosed, and the patient properly prepared for anæsthesia, because of the risk of trauma to the wall of the œsophagus and mediastinitis secondary to this. The hemimandible of a certain fish found in Lake Bosumtwi in Ghana has been removed from the œsophagus of patients on several occasions. Coins and washers are also frequently encountered. A probang is an unsafe instrument with which to attempt the removal of foreign bodies. Coins and washers are usually easy to remove as they are easy to see, being large in size, and do not penetrate the adjacent mucous membrane. Innumerable other types of foreign body may be encountered.

Œsophagoscopy and bronchoscopy are both best undertaken in an operating theatre with subdued light. Foreign bodies in the hypopharynx can usually be removed without undue difficulty using a Macintosh's laryngoscope and a crocodile forceps of the 10 in. size. If in a patient in the tropics there is sudden laryngeal stridor, but there is no history of a foreign body having been inspired, the usual cause of the condition is an ascaris worm impacted in the larynx. On two occasions patients seen suffering in this way coughed out an ascaris worm while in hospital being prepared for laryngoscopy. X-ray examination is of value where the foreign body present consists of radio-opaque material. Absence of any opaque foreign body in the presence of symptoms suggests the presence of a non opaque material causing the obstruction such as a ground nut, an ascaris worm, a glass bead or perhaps a sweet, none of which shows on X-ray examination.

In one instance an elderly patient was admitted to hospital complaining of something "stuck in the throat." He had no respiratory distress and the doctor first seeing the case did not appreciate the gravity of the situation. The patient was admitted late in the evening—he died suddenly during the night with complete laryngeal obstruction. On post-mortem examination it was found that he had a large piece of soft meat stuck in the larynx. Such a case emphasises the necessity of dealing with these cases without delay. Foreign bodies of characteristic type are found in particular areas of the world, these are usually the seed kernels of fruit grown in these areas. Date stones, melon seeds and cherry stones illustrate such types of foreign bodies. Ali[8] notes that the commonest foreign bodies found in the respiratory system of patients in Iraq are melon seeds. They are encountered most frequently in children between 2 and 3 years of age. He dealt with seventy cases in three years by bronchoscopic r The con ssociat with bronchitis. Antibiotic drugs are given f e the

of bronchial infection Chevalier-Jackson's fenestrated peanut forceps is recommended for their removal Nails and pins sometimes enter the trachea They show clearly on radiographic examination

One adolescent patient thought to have a lung abscess was found on X-ray examination to have a straight pin showing in the position of the right main lower lobe bronchus It was decided to remove the pin by bronchoscopy On passing the instrument to the appropriate level reaching into the right lower lobe bronchus the pin could not be seen, but a large reddish-brown mass was noted at the bottom of the bronchus, the nature of which was uncertain It looked remarkably like liver tissue, which was rather alarming It did not bleed and when gently pulled upon the mass was withdrawn cautiously by traction in the forceps A rusty pin was then found to be embedded in the brown mass On removing both with the forceps while the bronchoscopy was withdrawn, it was found that the pin was stuck in a red rubber bicycle tube patch This appeared most extraordinary On further questioning the patient the next day we were informed that he was using the pin and the rubber patch to keep a Scout badge in a buttonhole The patch with the pin inserted through it was being held in the mouth while getting the badge from his pocket Another boy struck him on the abdomen and he inspired the patch with the pin in it In the absence of extensive experience it is often difficult to recognise what exactly is being seen in the small visual field afforded through a bronchoscope This case illustrates the difficulty The patient made an uneventful recovery

In Europe hæmoptysis is usually due to either pulmonary tuberculosis, bronchial carcinoma, lung abscess or bronchiectasis In the tropics there are many forms of disease not seen in temperate zones which also cause hæmoptysis in addition to those noted in Europe Several conditions must be looked for, therefore, in all cases where blood is expectorated by patients in the tropics Carcinoma of the lung is rare in African patients as a general rule, but Osburn[9] reported a high incidence amongst African mine workers in the Gwanda gold mines of South Africa where there is an incidence closely approximating that found in Europe and North America, namely 10 6 per 100,000 workers at the age of 60 years The condition must therefore be considered in Africans particularly in the older age groups over 50 years

Acute pneumonitis of bacterial or virus origin is associated with an acute illness There is frequently blood streaking of the purulent sputum in such cases The rusty sputum of pneumonia is well known Frank hæmoptysis in pneumonia is seldom, if ever, seen Acute pulmonary diseases are in almost all cases treated under medical supervision, they occasionally occur as a post-operative anæsthetic complication due to occlusion of a bronchus by tenacious mucus or vomitus inspired into the pulmonary passages Acute pneumonic conditions sometimes occur in the tropics due to plague bacilli but this is rare Psittacosis also gives rise to pulmonary symptoms

Worm infections, particularly ankylostomiasis and ascariasis, give rise to pulmonary congestion and a cough with expectoration There is sometimes blood-staining of the sputum Schistosomiasis due to a trematode type of worm infection causes pulmonary symptoms in some cases In Egypt it is noted that

approximately 30 per cent of all cases of hæmoptysis show schistosome ova in the sputum The proportion of patients with schistosomiasis who show pulmonary signs is small, however Paul[10] carried out X-ray examinations on the chests of 300 patients with urinary schistosomiasis and found no characteristic appearances indicating pulmonary abnormality in them

As opposed to *Schistosoma hæmatobium* infections, pulmonary involvement with physical signs are the characteristic features of infection with paragonimiasis which is due to a closely allied trematode worm The distribution of paragonimiasis is principally China, Formosa and Japan Cases are also recorded from India and West Africa Chang *et al*,[11] working in China, carried out a most extensive and complete investigation on the subject of paragonimiasis Their statistical analysis of symptoms and signs is so complete that it is considered worth giving a [illegible]

first enter crabs of various sorts, and human infection is contracted by eating the flesh of undercooked or uncooked crabs Zahra,[12] working in Southern Cameroons in West Africa, reports an incidence of the disease from between 4 and 14 per cent of the total population of that area Pulmonary symptoms are the predominant feature In a small proportion of cases infection of the central nervous system with this parasite is also noted If chest symptoms and cerebral signs are seen in the same patient in the tropics this form of parasitic disease may be suspected The sputum should certainly be examined for the characteristic ova

Diaconita, Goldis and Nagy[13] note that paragonimiasis affecting the central nervous system causes a rise in intracranial tension with Jacksonian manifestations associated with cerebral cyst formation Chung and his associates,[14] working in Peking, have developed the skin hypersensitivity and complement fixation tests for paragonimiasis and record a 90 per cent accuracy using them in diagnosis

A small number of cases of paragonimiasis were seen personally in 1936 in Georgetown, Gambia, West Africa The patients came from Cassamance area The cases, about seven in number, were all seen within a short time of each other and were thought to be pulmonary tuberculosis, but no tubercle bacilli were found in the sputum, then the characteristic ova were noted in the sputum of about four of the patients No other cases were seen before or after this time It is important, if the condition is suspected, to find out if the patient is in the habit of eating crab meat, which is an invariable feature in the history in keeping with the ætiology of the condition The ova are characteristic being like pale yellow capsules with one end cut off and pushed in a little

Chung *et al*[15] advocate emetine and chloroquin as the standard drugs used in the treatment of paragonimiasis The former is rather toxic giving rise to a sense of lassitude and a condition like myosthenia gravis, this is improved by the use of prostigmin Chloroquin not being toxic is considered to have now displaced the earlier method of treatment with emetine The dosage of chloroquin is calculated on a basis of 1 1 to 2 6 gm per kilo of body weight for the full course according to the weight of the patient, giving up to 26 to 85 gm in the total course lasting over twelve weeks

referred to surgical departments for investigation of pulmonary conditions, the nature of which is not certain, but which may be ascertained by bronchoscopy, lipiodol X-ray examination, or other means Crushing or avulsion of the phrenic nerve is indicated in some cases of disease in the lower pulmonary field Most acute pulmonary infections give rise to bilateral disease and in most cases clear up completely with medical treatment In some instances permanent defects remain as complications

Lipiodol radiographs are taken after introduction of the material into the trachea by various routes The most satisfactory method of introducing the iodised oil into the trachea is through a rubber catheter passed through the nostril and thence through the vocal cords Preliminary cocainisation of the nose, throat and larynx is necessary General anæsthesia can also be used, and is more pleasant for the patient Before the oil is introduced the patient is appropriately tilted to encourage the oil into the main bronchus of the side requiring examination It is usual to examine one side only Both sides can, however, be examined at the same session and a photograph taken as shown in Fig 292 Here a normal bronchial shadow is shown on both sides In Fig 293 the bronchial shadow is normal on the right side, but there is a complete bronchial obstruction at the base of the left main bronchus This patient, a European, was suffering from primary bronchial carcinoma These pictures were taken from a thesis on "Primary carcinoma of the lung "[70]

Wounds of the pleural cavity and lung are associated with a marked degree of shock There is usually infection present in the wound and loss of blood It is essential in penetrating chest wounds to close the wound at the earliest possible time Infection must be combated and blood loss restored Expansion of the collapsed lung is encouraged by closure of the wound with a double layer of wide elastoplast strapping initially and aspiration of air from the pleural cavity using a sterile serum needle and rubber tube attached to an electric suction pump Because of the urgency of the condition and the danger of giving a general anæsthetic, it is advisable to clean the wound rapidly and apply two or three layers of elastoplast over the wound initially After the patient has recovered from shock, two or three sutures can be inserted into the edges of the wound to draw it together more accurately If there is evidence of internal hæmorrhage associated with stab wounds a blood transfusion should be given as soon as possible

Empyema is becoming a rare condition since the free use of sulpha dr the treatment of pneumococcal pneumonia It will be noted in patients in that about 75 per cent of all patients suffering from empyema have sickle present in the blood This is an incidence which is much higher than that i in the general population, where the figure is on an average 20 per cent It v greatly in different places, from 5 to 40 per cent There is no doubt what that sicklæmia predisposes to empyema as it does to many other infective conditi In view of the operative risk caused to such patients by the administration c general anæsthesia, particularly where no oxygen is available for administrat with the anæsthetic, it is advisable where possible to drain the empyema under lo anæsthetic The most suitable position for an empyema operation in adults is to ha the patient sitting on the side of the operating table leaning forward with the le

flexed at the hips and the knees and placed on a chair at the side of the operating table Before attempting to open an empyema the chest should be aspirated to ensure that pus is present The necessity for doing this is to obviate the risk of opening a tuberculous pleural effusion inadvertently Such cases may run a high irregular temperature due to active tuberculosis and so the case simulates an empyema very closely

In draining an empyema the opening into the pleural cavity through the bed of the rib removed should be only of sufficient size to admit the drainage tube Closed drainage should be employed The rubber tube from the pleural cavity to the drainage bottle should be attached to a glass tube coming through the stopper of the bottle and not placed loosely in the disinfectant solution in the



Fig 294



Fig 295

Fig 294—X ray of chest showing large non tuberculous cavity in upper lobe of right lung
Fig 295—X ray photograph of chest same patient, following thoracoplasty

bottle If it is not firmly fixed to a glass tube the rubber will certainly be pulled out of the water, allowing air to go into the pleural cavity and defeating the object of the method which is to encourage expansion of the lung during drainage The rubber tube must be clipped off securely whenever the bottle is changed Drainage is necessary for two weeks in most cases

If a pulmonary cavity develops in a patient with pulmonary tuberculosis it is a constant source of danger Cough continues due to the irritation of secretion from the cavity Secondary hæmorrhage is liable to occur repeatedly This lesion acts as a danger to other persons where tubercle bacilli are present in the sputum Careful selection of tuberculous cases is necessary in choosing those suitable for surgical procedures Operative treatment is indicated only when the active stage of the disease is past In chronic cases where the patient has recovered a fair measure of his general health, much benefit is gained by the closure of pulmonary cavities by thoracoplasty This operation is sometimes indicated in non-tuberculous cases where a very large cavity is present Fig 294 shows X-ray picture of a child s

referred to surgical departments for investigation of pulmonary conditions, the nature of which is not certain, but which may be ascertained by bronchoscopy, lipiodol X-ray examination, or other means Crushing or avulsion of the phrenic nerve is indicated in some cases of disease in the lower pulmonary field Most acute pulmonary infections give rise to bilateral disease and in most cases clear up completely with medical treatment In some instances permanent defects remain as complications

Lipiodol radiographs are taken after introduction of the material into the trachea by various routes *The most satisfactory method of introducing the iodised* oil into the trachea is through a rubber catheter passed through the nostril and thence through the vocal cords Preliminary cocainisation of the nose, throat and larynx is necessary General anæsthesia can also be used, and is more pleasant for the patient Before the oil is introduced the patient is appropriately tilted to encourage the oil into the main bronchus of the side requiring examination It is usual to examine one side only Both sides can, however, be examined at the same session and a photograph taken as shown in Fig 292 Here a normal bronchial shadow is shown on both sides In Fig 293 the bronchial shadow is normal on the right side, but there is a complete bronchial obstruction at the base of the left main bronchus This patient, a European, was suffering from *primary bronchial carcinoma These pictures were taken from a thesis on* " Primary carcinoma of the lung "[70]

Wounds of the pleural cavity and lung are associated with a marked degree of shock There is usually infection present in the wound and loss of blood *It is essential in penetrating chest wounds to close the wound at the earliest possible* time Infection must be combated and blood loss restored Expansion of the collapsed lung is encouraged by closure of the wound with a double layer of wide elastoplast strapping initially and aspiration of air from the pleural cavity using a sterile serum needle and rubber tube attached to an electric suction pump Because of the urgency of the condition and the danger of giving a general anæsthetic, it is advisable to clean the wound rapidly and apply two or three *layers of elastoplast over the wound initially After the patient has recovered from* shock, two or three sutures can be inserted into the edges of the wound to draw it together more accurately If there is evidence of internal hæmorrhage associated with stab wounds a blood transfusion should be given as soon as possible

Empyema is becoming a rare condition since the free use of sulpha drugs in the treatment of pneumococcal pneumonia It will be noted in patients in Africa that about 75 per cent of all patients suffering from empyema have sickle cells present in the blood This is an incidence which is much higher than that noted
... where the figure is on an average 20 per cent It varies
... ere is no doubt whatever
... other infective conditions

In view of the operative risk caused to such patients by the administration of a general anæsthesia, particularly where no oxygen is available for administration
... here possible to drain the empyema under local
... adults is to have
... rd with the legs

flexed at the hips and the knees and placed on a chair at the side of the operating table Before attempting to open an empyema the chest should be aspirated to ensure that pus is present The necessity for doing this is to obviate the risk of opening a tuberculous pleural effusion inadvertently Such cases may run a high irregular temperature due to active tuberculosis and so the case simulates an empyema very closely

In draining an empyema the opening into the pleural cavity through the bed of the rib removed should be only of sufficient size to admit the drainage tube Closed drainage should be employed The rubber tube from the pleural cavity to the drainage bottle should be attached to a glass tube coming through the stopper of the bottle and not placed loosely in the disinfectant solution in the



Fig 294



Fig 295

Fig 294—X ray of chest showing large non tuberculous cavity in upper lobe of right lung
Fig 295—X ray photograph of chest same patient following thoracoplasty

bottle If it is not firmly fixed to a glass tube the rubber will certainly be pulled out of the water, allowing air to go into the pleural cavity and defeating the object of the method which is to encourage expansion of the lung during drainage The rubber tube must be clipped off securely whenever the bottle is changed Drainage is necessary for two weeks in most cases

If a pulmonary cavity develops in a patient with pulmonary tuberculosis it is a constant source of danger Cough continues due to the irritation of secretion from the cavity Secondary hæmorrhage is liable to occur repeatedly This lesion acts as a danger to other persons where tubercle bacilli are present in the sputum Careful selection of tuberculous cases is necessary in choosing those suitable for surgical procedures Operative treatment is indicated only when the active stage of the disease is past In chronic cases where the patient has recovered a fair measure of his general health, much benefit is gained by the closure of pulmonary cavities by thoracoplasty This operation is sometimes indicated in non tuberculous cases where a very large cavity is present Fig 294 shows X-ray picture of a child s

rib spreader, and an Edwards' mechanical retractor for the scapula Each of these is invaluable and greatly facilitates chest operations Only if the scapula is adequately retracted with this mechanical device is it possible to remove the whole of the first rib, and to get a good result in a thoracoplasty this is desirable With the long-handled rib cutters, division of ribs constitutes no difficulty which is not the case when short-handled clippers are used

The matter of thoracic surgery under local anæsthesia should be given serious consideration in surgical centres in the tropical world, for it is unlikely that the services of skilled anæsthetists will be freely available other than in the few large centres for many years to come Pudovkin,[27] working in a remote district hospital in Russia with limited facilities, undertook thoracic surgery under local anæsthesia and reports twenty-one pulmonary resections, some lobectomies, and also thoracoplasties without any fatalities

EXTRACT

Diseases of the [illegible] ratory tract— Paragonimiasis
A clinical study [illegible] ases
Symptoms div [illegible] hest, Abdominal Central Nervous System and General

[illegible]		Per cent
[illegible] breathing	105	52 5
[illegible] s s	147	73 5
[illegible] ns	187	93 5
[illegible] u um	191	95 5
[illegible] a on	200	100 0
[illegible]		
[illegible] on	10	5·0
[illegible] d o	22	11·0
V [illegible] g	41	20 5
Naus a	54	27 5
Abd minal d s omfort	55	27 5
Diarrh a	109	54 5
Abd m n l [illegible] ns	149	72 5
CENTRAL NERVOUS SYSTEM		
Nerve root pa n	2	1 0
D plopia	1	0 5
Diabet s	1	0 5
Aphonia	1	0 5
Blurring of speech	1	0 5
Vision delus ns	1	0 5
Psychopathic personality	2	1 0
Mental slowness	3	1 5
Stiff neck	3	1 5
Urinary retention	6	3·0
Monoplegia	4	2 0
Paraplegia	6	3 0
Hem plegia	13	6 5
Paresthesia	13	6 5
Impaired vis on	28	14 0
Convuls ons	35	17 5
Headaches	46	23 0

SURGICAL CONDITIONS OF THE RESPIRATORY TRACT

GENERAL		
Skin eruption	20	10 0
Loss of weight	71	35 5
Sweating	89	44 5
Lassitude	101	50 5
Anorexia	103	51 5
Fever	134	67 0

CHANG, H -T, WANG, C -W, YU, C -F, HSU, C F & FANG, J C (1958) *Chin med J* 76, 3

REFERENCES

1 DANNA, J A (1946) The treatment of sebaceous cyst by electro-surgical marsupialisation *Ann Surg* 123, 952

2 HELMAN, J (1957) Some diseases amongst the Hottentots of South West Africa *Cent Afr J Med* 3, 143

3 ALEXANDER, G L (1958) Malignant disease in West Africa and Malaya compared Personal communication

4 VERVOORN, J D & DE JAGER, H (1959) Rhinoscleroma in Ghana *Docum Med geogr trop (Amst)*, 11, 182

5 SHAH, N J (1955) Study of otogenic tetanus *Indian J med Sci* 9, 52

6 LEE, P S (1950) Oil of *Brucea javanica* in treatment of papilloma of the external auditory canal *Chin med J* 68, 103

7 CHARTERS, A D (1957) Epidemic vertigo in Kenya *E Afr med J* 34, 7

8 ALI, D S (1959) Water-melon seeds as foreign bodies in the tracheo-bronchial tree of children *J Fac Med Iraq*, 1, 27

9 OSBURN, H S (1957) Cancer of the lung in Gwanda *Cent Afr J Med* 3, 215

10 PAUL, R (1956) Pulmonary schistosomiasis *Cent Afr J Med* 2, 355

11 CHANG, H T *et al* (1958) Paragonimiasis *Chin med* 77, 3

12 ZAHRA, A (1952) Paragonimiasis in the Southern Cameroons *W Afr med J* 1, 75

13 DIACONITA, G H, GOLDIS, G & NAGY, P (1957) Cerebral distomatosis (paragonimiasis) *Acta med scand* 159 (II), 135

14 CHUNG, H -L *et al* (1955) The value of complement fixation test and intradermal test in diagnosis of paragonimiasis *Chin med J* 73, 47

15 CHUNG, H -L *et al* (1954) Chemotherapy of paragonimiasis *Chin med J* 72, 407

16 ALEXANDER, G L (1933) Note on avulsion of the phrenic nerve in a case of liver abscess *W Afr med J* 7 (old series), 103

17 AMERICAN COLLEGE OF CHEST PHYSICIANS (1959) Chemotherapeutics of specific infectious diseases of lower respiratory tract report of select committee *Rocky Mtn med J* 56, 57

18 SILVERA, W D & KONSTAM, P G (1954) A case of histoplasma duboisii infection *W Afr med J* 3, 32

19 DEAN, G (1957) Cave disease *Cent Afr J Med* 3, 79

20 BOWESMAN, C (1934) Primary carcinoma of the lung *Irish J med Sci* p 49

21 ASIVOV, B K (1958) Three thousand operations on thoracic organs under local anaesthesia *Khirurgia (U S S R)*, 6, 33

22 PUDOVKIN, I V (1959) *Experience of lung resection in conditions of a district hospital* *Khirurgia (U S S R)*, 1, 33

28

Surgical Conditions of the Eye

CONJUNCTIVAL INFECTIONS

OPHTHALMIC work is a highly specialised branch of surgery The correction of refractive errors presents no special features relative to tropical diseases There are, however, few doctors in the tropics specialising in the treatment of eye diseases as the limited staff available is used to undertake general medical and surgical work on a non-specialised basis All doctors are expected to be able to deal with eye cases which do not call for more than average skill or training It would be quite impractical to transfer all patients with eye disease to the few centres in large towns where an eye specialist is located Under *these circumstances a short section is included in this book to give some indication* of the diseases which are most likely to be encountered in many parts of the tropics and [illegible]

cond [illegible]

Ocular congestion is usual in most infective fevers Icteric tingeing of the conjunctiva occurs in many diseases affecting the liver, it also occurs in hæmolytic *conditions It is usual following sickle cell crises*

The prevalence of advanced eye disease is very conspicuous in most under-developed areas of the world There is much blindness which might have been avoided if simple methods of treatment had been instituted at an early stage Most children born into the world are still delivered by an untrained midwife Under these circumstances, prophylactic treatment against eye infection in the infant is neglected at birth Gonorrhœal ophthalmia neonatorum is still occasionally seen *Swabbing the infant's eyes at birth with 1 per cent silver nitrate has become* the standard method of prophylactic treatment and this works well If without, or in spite of, such treatment the infant develops gonorrhœal ophthalmia, it is best treated by the instillation of penicillin eye drops 1,000 units per c c The drops should be applied every five minutes till the discharge stops, which is usually within one hour Considering the seriousness of the condition being treated, its rapid cure with penicillin is a remarkable achievement Sulphonilamide eye drops *are less efficient and more painful Local eye swabbing* and penicillin by injection, 50,000 units three times a day, is also curative, it should be used for two days Sulphamezathine can also be used giving the infant half a tablet four-hourly for two days and then a quarter of a tablet four-hourly for a further three days If the child shows any evidence of dyspnœa the tablets should be stopped The mother also requires treatment for a gonorrhœal infection

Large epidemics of conjunctivitis occur frequently in the tropics Children are most often affected The outbreaks occur usually at the early part of the rainy season At this time there is a great increase of flies If these children are

untreated the conjunctivitis continues for up to about three months There is redness of the eyes with seropurulent discharge The irritation is aggravated by the child rubbing the eyes constantly because of the discomfort caused by the condition The discharges contain mixed organisms in most cases There is usually a primary infecting germ such as that of Morax-Axenfeld diplobacillus, or Koch-Weeks bacillus which typically affect the eye Staphylococci and streptococci pneumococci or diphtheroid bacilli are sometimes found in eye discharges A type of conjunctivitis not seen in temperate climates but not uncommon in the tropics is that due to spirochætes If this occurs there is a tendency to ulceration along the edges of the lids and this spreads on to the skin of the eyelid in some instances A patch of granulation tissue is formed which heals slowly and is followed by a typical "flat scar" which is surrounded by a slight overhanging edge of the surrounding normal skin Conjunctivitis due to *Brucella tularense* is sometimes seen in the tropics but it is rare The infection is contracted from contact with rabbits and members of the squirrel family The conjunctivitis is associated with ulceration of the cornea and marked swelling of the lids The tetracycline drugs are most effective in treatment of the condition, used as locally applied terramycin ointment and given as capsules by mouth

Four cases were seen in West Africa of a very chronic form of conjunctivitis in soldiers returned from Burma to West Africa There was a thickening of the conjunctiva with granulation tissue formation and a low-grade ulceration about the limbus of the cornea The patients were admitted to the surgical wards because of chronic associated ulceration about the preauricular and cervical glands The condition was thought to be Parinaud's conjunctivitis the cause of which is not known Tuberculosis, syphilis and tularensis have all been suggested as a possible cause The granulation of the cervical lesions did not show any tubercle bacilli on section The Kahn reaction was negative and it was thought that tularensis was a possible cause The cases were seen in 1946 before tetracycline drugs were available for treatment Allergic conjunctivitis is invariably associated with allergic rhinitis and hay fever It is unpleasant but not serious Benadryl, 50 mg three times a day, is useful in symptomatic treatment Avoidance of contact with the particular substance to which the patient is sensitive is desirable, but it is usually difficult to ascertain what the patient is sensitive to Ephedrine eye drops 1 per cent are also useful in treatment

Phlyctenular conjunctivitis is also seen in the tropics The condition is very painful Two per cent yellow oxide of mercury ointment is advised in treatment Conjunctivitis due to the powder from moths' wings is seen more often in the tropics than in temperate zones This usually happens if a moth has been killed by the hand and the eye is then rubbed with the hand which has moth wing powder on it The blowing of dust in hot arid countries is a potent cause of conjunctival irritation, sand particles enter the eye and these minute foreign bodies predispose to corneal ulceration particularly in an already inflamed or unhealthy eye Ulceration in the presence of infection is more serious because of the liability of the ulcer spreading with ultimate formation of a staphyloma

The nutrition of the epithelium of the eye is adversely affected by deficiency of vitamin A in many parts of the tropics Deficiency of vitamins B and C is also

detrimental to the nutrition of the eye but to a lesser extent than vitamin A Manifestations of vitamin A are seen as they affect the eyes in the form of xerophthalmia, Bigot's spots, night blindness and corneal ulceration Where there is a degree of avitaminosis present in the community, eye complications are particularly likely to be apparent when other diseases occur This is notably the case with measles The eye is sometimes affected by herpes manifestated along the course of the ophthalmic division of the trigeminal nerve

Fig 1 shows a child suffering from complete blindness as a result of corneal ulceration secondary to measles and avitaminosis A In some outbreaks of measles in the tropics as many as 25 per cent of the patients have eye complications of varying degrees of severity If eye complications become apparent atropinisation of the eyes is desirable Schwendler [1] was of the opinion that omnicillin was more beneficial in treatment of patients with eye complications with measles than other preparations of penicillin or streptomycin Thompson,[2] considering the eye signs of vitamin A deficiency in the Ipoh district of Malaya, noted night blindness, conjunctival staining, Bigot's spots, xerophthalmia or crinkling of the conjunctiva and keratomalacia He considered that the most efficient method of dealing with cases of vitamin A deficiency was by injection of vitamin A (100,000 units) twice a week Vitamin A injection is a benefit not only to the eye condition but also to the nutrition of the bronchial epithelium The bronchitis associated with measles is well known Attention to diet is also important The removal of various parasitic infections should also be undertaken as they adversely affect the general health

Trachoma is an eye disease which is rampant in some parts of the tropics It is probably the commonest cause of blindness and chronic eye disease. The common practice in many parts of Africa of persons using black metallic powder as an eye cosmetic predisposes to the spread of trachoma Patients with trachoma sometimes in politeness, as is customary, offer their eye powder container to their friends, who apply the powder with the dip stick attached to the stopper The stick is in some cases infected with trachoma and so is a means of spreading the disease Trachoma is a difficult disease to treat The method of rupturing the follicles on the upper and lower eyelids and applying copper sulphate stick has been employed for many years It is now less frequently used than formerly The use of tetracycline drugs taken by mouth as well as by local application to the granulation on the lids in the form of terramycin ointment has given promising results

The serious late complications of trachoma are keratitis associated with encroachment of blood-vessels on to the cornea in the upper segment of the eye (pannus) and the formation of subepithelial reactionary fibrous tissue in the lid areas The fibrous tissue slowly contracts and this causes a gradual inversion of the eyelashes as the distance between the top of the upper conjunctival sac and the edge of the lid is reduced As the lashes impinge on the cornea there is considerable discomfort and the keratitis already present is aggravated A form of traumatic conjunctivitis develops and the patient makes the condition worse by constantly rubbing the eye in an effort to reduce the irritation present Trachoma is most infectious at the early acute stage of the condition By the time the entropion develops the condition is probably quiescent in most cases Secondary infection in the conjunctival sac should be treated and the lashes

epilated initially in order to rest the patient's eye in preparation for some form of entropion operation on the upper lid

The object of all entropion operations is to take away the eyelashes from the *surface of the eye* *This may be achieved by several methods (Fig 297)* *Epilation* of the lashes is only of temporary benefit as the lashes grow again Electrolysis of the hair follicles of the eyelashes is a suitable method of treatment in some early cases of entropion By this means the eyelash follicles are destroyed Other

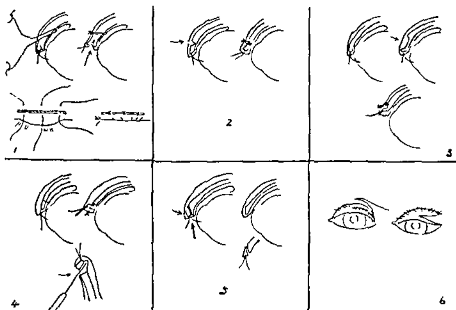


FIG 297
Diagrams illustrating entropion operations Six methods shown

methods of treatment are surgical procedures designed to alter the tarsal plate in such a way as to take away the lashes from the surface of the eye The most radical method of dealing with the offending eyelashes is to remove the hair follicles completely with the lower third of the tarsal plate in its anterior half only (Fig 297, 5)

Chang,[3] working in Hong Kong, has dealt with a series of 1,252 cases of entropion, he favours the method of splitting the tarsal plate along its free border in a position between the site where the eyelashes emerge and the conjunctival edge Three or four sutures are then inserted between the upper part of the lid on its conjunctival aspect and the skin of the eyelid close to where it carries the lashes The double suture is inserted using a small curved needle on each end of the ligature material By tightening this stitch and tying it over a length of braided nylon, to prevent it cutting through the skin surface, the eyelash area is drawn away from the cornea as the gap made by the incision is opened out In this way the tarsal plate remains opposed to the cornea but the lashes are drawn

up with the skin as it is raised from the tarsal plate, the suture being inserted higher up internally than the position at which it is brought out through the skin of the eyelid externally (Fig 297, 1) The gap so formed between the two parts of the surface of the divided tarsal plate epithelialises in due course A mucous membrane inset graft has been used by some surgeons in this position to decrease the risk of recurrence Chang undertakes the operation under local anæsthetic, 1 c c of novocain (1 per cent) with adrenaline added and considers that it is one of the simplest and most satisfactory operations for this condition The operating time is short Bleeding is not excessive and those operated upon can be treated as out-patients Cocaine drops 4 per cent are put into the patient's eye before the operation is undertaken

The method of dealing with these cases by excising a transverse wedge of cartilage from the dorsal surface of the lid and everting the lower third of the lid by retaining sutures gives good results if the case is not too advanced The operation employed must be calculated to give the patient the maximum relief and essentially ensure a permanent cure with no likelihood of recurrence In many parts of the tropics patients come for treatment at a very late stage of the disease There is usually impending loss of sight and in view of the difficulty of keeping patients under observation, it is considered that whereas wedge tarsorraphy is suitable in early cases and has the advantage of preserving the cosmetic effect of the eyelashes, in 75 per cent of the cases personally seen it is a race against time to prevent complete blindness In these advanced cases it is considered that the most suitable operation to perform at this stage is removal of the complete lash-bearing area This operation is undertaken using local anæsthetic, 1 per cent novocain in the lid with adrenaline added and cocaine eye drops 4 per cent instilled into the eye The upper eyelid is firmly held in a Knapp's entropion forceps and split from end to end between the line of the lashes and the conjunctiva along its free margin with a von Graefe's cataract knife The anterior part of the tarsal plate is separated in its lower third from the remainder of the tarsal plate Scissors are then used to cut the skin of the eyelid close to the lash-bearing area at the lowermost part of the structure The skin of the lid is picked up with a fine forceps and snipped close to the lid edge at about the middle of the structure The grip of the forceps is then altered so that the two cut edges are held together The pointed blade of the scissors is then run under the skin to the inner and outer aspects of the lid at its lower edge and the lash area then taken out completely Very little skin is removed and the ocular surface of the tarsal plate is not damaged in any way The lower skin edge and the remaining edge of the tarsal plate are then sutured together with fine catgut (No 0000) and the patient allowed to go home with a dressing in position covering the eye The eye is dressed two or three days later Many of the patients do not require a second dressing It is much more important to retain the patient's sight than to preserve the cosmetic appearance of the eyelashes at this stage of the disease

Following trachoma operations sight is much improved Reactionary keratitis decreases as the source of irritation is removed Much detail is given in works on operative ophthalmology dealing with the large number of operations for entropion A meibomian cyst of the eyelid is a retention cyst of one of the tarsal

glands, it gives rise to a discrete swelling about the mid lid area, most often in the upper lid If the cyst is near the margin of the eyelid, it can be evacuated by puncturing it with a very fine diathermy needle under anæsthesia It is more usual to evacuate these cysts through the conjunctival surface of the lid while holding the lid in a special chalazion forceps of the ring type The cyst is incised and curetted out If such a cyst bursts spontaneously into the conjunctival sac, it is liable to be followed by a small granulomatous polypus in the upper conjunctival sac This needs to be removed as well as the lining of the cyst

A stye is an infection in an eyelash follicle It is best left alone till it ruptures itself and then swabbed gently with a mild disinfectant solution If it is squeezed prematurely, it is followed by much swelling of the lid Being an infective condition the patient should be given an antibiotic drug at an early stage so that the condition localises quickly or resolves in early cases Local applications are of very limited value, if any, in treatment of styes

A low grade chronic conjunctival congestion is in some instances a manifestation of onchocerciasis If an apparent conjunctivitis does not respond to local applications satisfactorily after a few days this condition should be looked for, especially if the case occurs in a district where onchocerciasis is a prevalent disease

EYE INJURIES

In spite of the eye being a very highly specialised structure, it is astonishing how it recovers following injuries Damage to the anterior chamber alone is seldom followed by complete blindness, although there is often some interference with vision due to corneal scarring and damage to the iris Injury of the lens is likely to be followed by opacity in some segment reducing vision to a low level If the vitreous body is perforated via the anterior chamber sight is lost in almost all cases Sight is not necessarily lost following small perforating wounds which enter the posterior chamber through the lateral scleral wall Wounding of the anterior chamber is usually followed by a major degree of recovery if gross infection can be avoided It is advisable in these cases to wash out the eye with sterile normal saline under an intravenous anæsthetic Replacement of a prolapsed iris through a corneal wound may be necessary Atropine is then instilled into the eye in order to remove the pupil as far as possible from the corneal wound so preventing subsequent adhesions in the wound area Penicillin eye drops should also be instilled in these cases The lids are then gently approximated and a double wool pad applied over a gauze swab, these are held in position by a well applied crepe bandage which ensures even pressure to the globe The majority of corneal wounds heal well and the anterior chamber fills up again with aqueous fluid within three to five days

Many wounds of the anterior chamber of the eye give an appearance initially suggesting irreparable damage to the eye, but in a high proportion of the cases recovery is almost complete, leaving few or no complications or visible mark of the injury Immediate removal of an eye following an accident is seldom indicated unless the vitreous body is damaged through the anterior chamber, when there are essentially several structures injured A daily injection of 50 mg of cortisone

is an advantage following eye injuries as this decreases œdema and surface exudation Operation carried out on the eye under intravenous anæsthesia has the advantage that it is seldom followed by vomiting The operator is not hampered by anæsthetic apparatus about the face during the procedure

Because of the frequent occurrence of accidents to the eye in the tropics all casualty departments should *have a complete set of eyedrop bottles filled with the* drugs most frequently required for treatment of urgent eye cases Such a set of eye drugs is unfortunately seldom kept in readiness and this should not be so The following set of eye drugs is suggested

1 Cocaine hydrochloride, 4 per cent To relieve pain
2 Homatropine hydrobromide, 2 per cent As a mild mydriatic
3 Ephedrine, 5 per cent Mild mydriatic not upsetting accommodation
4 Eserine salicylate, 1 per cent To counteract the homatropine as required
5 Pilocarpine nitrate, 1 per cent Acts as mild miotic and is not painful
6 Fluorescein, 2 per cent solution to test for corneal ulceration
7 Penicillin eyedrops 1,000 units per c c to counteract infections
8 Normal saline, 0 9 per cent strength, to wash out the eye
9 Protargol, 5 per cent solution as an eye disinfectant

Cocaine lamellæ are useful as they keep well and rapid relief is afforded in cases of eye injury or when a foreign body enters the eye Foreign bodies entering the eye should be removed as soon as possible after the injury is sustained Small particles entering the eye can usually be removed from the cornea or deep surface of the lids without undue difficulty, if they are seen within four hours of the injury *Subsequent to this time they become much more* adherent to the eye surface A full set of eye spuds should also be available for removal of foreign bodies, sharp, blunt, pointed and spatulate being required When spuds are being used the eye must be well cocainised so that the patient does not react by sudden movement when the cornea is touched Before attempting to remove a foreign body the *cocainised cornea should be touched with a blunt instrument which will not cause* damage to the surface of the eye if the patient moves This simple precaution prevents injury when using a spud to "push off" a foreign body The direction of force used should be such that no damage is done to other parts of the eye in the event of the patient blinking If a foreign body cannot be seen on the cornea the under surface of the upper lid should be inspected, for *in many instances* it adheres in that position Attached particles can usually be removed easily from this position by rubbing the area with a moist saline swab Following removal of a foreign body, a drop of homatropine should be put into the eye and a pad and bandage applied till the next day If a foreign body remains on the cornea more than eight hours almost invariably a minute area of ulceration occurs beneath it This requires treatment by application of atropine, pad and bandage otherwise the ulceration is liable to spread and give rise to a subsequent opacity

If a foreign body has been adherent to the cornea for less than two hours, it can in almost all cases be removed without difficulty by the simple device of drawing a loop of hair across the surface of the eye This method is not painful

and removes the foreign body in an atraumatic manner in a high proportion of the cases The method can be used without an anæsthetic of any sort This simple method was first described to me when a house surgeon in hospital in Carlisle, England (1931) A railway engine driver related how he frequently got coal dust in his eye while stoking a railway train when travelling and as he said, " You can't go to hospital with a train on your hands,' so his colleague removed the foreign body from the eye whenever it occurred by the hair-loop method The method is very simple and effective in a high proportion of cases

A form of eye injury frequently encountered in the tropics, but seldom seen in temperate climates, is that due to the bursting of soda water bottles when glass splinters enter the eye Many such cases were seen in a large West African town where a brewery was in business Bottles were in short supply and so were used repeatedly The tension of gas instilled into the bottles although probably standard for temperate climates was much in excess of that suitable under high temperature conditions Soda-water bottles frequently exploded on handling and on some occasions burst spontaneously while on the shelves of commercial stores This accident usually happened between two and three o clock in the afternoon when the temperature was very high Several patients lost an eye from this cause and it was a comparatively common accident amongst labourers handling the bottled soda water Ultimately the brewery concerned reduced the gas pressure on our recommendation because of the frequency of this accident A small splinter of glass penetrated all layers of the eye in almost all cases and lodged in the retro-orbital tissues Panophthalmitis developed rapidly in most of these cases with loss of the eye The injury was in most cases irreparable

The method of removing metal foreign bodies from the eye by electric magnet has not been used personally, the instrument not being available In the absence of personal experience the method is merely mentioned without further comment It is a recognised procedure of value

If the loss of an eye is inevitable following an injury, it should be removed by the method of evisceration (Fig 298), not enucleation In the absence of malignancy the sclerotic coat of the eye with the muscles attached should be retained as it provides a movable bed into which an artificial eye can be fitted If the sclerotic coat and muscles remain the artificial eye moves synchronously with the normal eye This gives a much better cosmetic result than when the complete eye is removed by enucleation When enucleation is carried out as in malignant cases the artificial eye does not move synchronously with the normal eye and so gives a persistent staring appearance which is unsightly Enucleation is used only in malignant cases where it is desirable to remove all tissues within the orbital cavity because of the nature of the disease

In cases of burning of the conjunctival sac by chemical solutions there is liable to be extensive œdema of the conjunctiva kemosis (Fig 299) It is advisable in these cases to wash out the eye well and close the lids with three interrupted [illegible]

should in no circumstances be excised for if any of it is removed the amount

remaining after the inflammation has subsided will not be sufficient to accommodate movements of the eye without pulling on surrounding structures

Diplopia is likely to occur in cases where there is a fracture of the maxilla causing an alteration of the level of the inferior orbital plate This is a disquieting accident but the patient usually adjusts himself to a minor degree of altered vision after some months If the alteration of the eye level is sufficient to cause a conspicuous difference in the level of the eyes on observing the patient from in front, it is advisable to elevate the inferior orbital plate by surgical means,



FIG 298 FIG 299

Fig 298—Evisceration of left eye showing forward position of blade of scalpel making an *upward cut*

Fig 299—Kemosis of right eye following injury by chemicals three days earlier

without delay, using leverage applied with an instrument inserted through the zygomatic arch

Bruises of the eyeball are often associated with extensive subconjunctival hæmorrhages Such bleeding invariably resolves slowly and disappears after several weeks There is temporary discoloration initially red, becoming a greenish yellow shade These hæmorrhages seldom become secondarily infected Adequate sedation is necessary following eye injuries as they are very painful conditions in most cases If a radio opaque foreign body enters the eye a stereoscopic X ray photograph should be undertaken to localise it accurately before any attempt is made to remove it In some instances a foreign body initially thought to be in the eye is found to be extra ocular in position and may be better left alone It is a great advantage to have a pair of high powered spectacles available with which to examine eye cases A slit lamp is most useful in examining the anterior chamber and the cornea for foreign bodies

TROPICAL EYE DISEASES

Brief mention is made of several eye conditions seen almost exclusively in tropical countries Adequate examination of the eye gives a good indication of systemic diseases as seen in all parts of the world Various forms of retinitis and also optic atrophy can be detected by ophthalmoscopic examination In cases of miliary tuberculosis, tubercles can sometimes be seen on the retina Retinal infarcts are also recognisable Iritis may be the first indication of neglected gonorrhœa Tuberculous and syphilitic iritis are seen, which are not primary eye conditions, but manifestations of generalised conditions Ritter s disease, causing chronic conjunctivitis and iritis, is another example of eye signs being indicative of disease elsewhere

Prior to the introduction of synthetic drugs for the treatment of malaria quinine was used almost exclusively in treatment In a small proportion of the cases quinine caused a spasm of the artery of the retina with marked pallor of the retina, and the term " quinine amblyopia " was used for this form of interference with vision The interference with vision was temporary, usually lasting for a few hours, but in some cases it remained for several days This condition is now seldom seen Little reliance can be placed on eye signs in cases of snake bite as indicating the possible type of snake having bitten the patient In cases of rabies the pupils are almost invariably dilated when obvious clinical signs of this fatal condition are present

Microfilaria can be seen in the anterior chamber of the eye quite frequently in districts where onchocerciasis is prevalent The microfilaria can also be found in the serum expressed from snippings of conjunctiva removed under local anæsthesia Onchocerciasis affects all parts of the eye Patients with leprosy frequently have marked epiphora due to obstruction of the lacrymal ducts where the nasal mucous membrane and lacrymal sac are implicated Some degree of interstitial keratitis is usual in leprosy There is usually other obvious evidence of the disease elsewhere, dry patches of skin with decreased sweating apparent, and alteration in colour, also thickening of palpable nerves (Fig 175) The ulnar nerve is particularly liable to become thickened In leprosy cases the " tear in the eye " appearance is frequently very obvious

In cases of trypanosomiasis there is frequently an acute swelling about the eye without any evidence of injury, seen most commonly in cases of Chagas' disease, South American trypanosomiasis It is less frequently seen with either of the varieties of African sleeping sickness Iridocyclitis is not uncommon in untreated trypanosome cases of all types, though it is seldom looked for Corneal opacities are seldom attributed to sleeping sickness, but it has been noted personally that in treating cases of trypanosomiasis on an experimental basis with 4 4 diamidino-stilbene (Bowesman [4]), that corneal opacities cleared up in a remarkable manner while cases were under treatment with this drug No local treatment was given and these opacities were not originally attributed to trypanosomiasis, but in view of the spectacular improvement with this drug it seems that without doubt they were an eye complication of sleeping sickness The effect of pentamadine drugs

remaining after the inflammation has subsided will not be sufficient to accommodate movements of the eye without pulling on surrounding structures

Diplopia is likely to occur in cases where there is a fracture of the maxilla causing an alteration of the level of the inferior orbital plate This is a disquieting accident but the patient usually adjusts himself to a minor degree of altered vision after some months If the alteration of the eye level is sufficient to cause a conspicuous difference in the level of the eyes on observing the patient from in front, it is advisable to elevate the inferior orbital plate by surgical means,



FIG 298 FIG 299

Fig 298—Evisceration of left eye showing forward position of blade of scalpel making an *upward cut*

Fig 299—Kemosis of right eye following injury by chemicals three days earlier

without delay, using leverage applied with an instrument inserted through the zygomatic arch

Bruises of the eyeball are often associated with extensive subconjunctival hæmorrhages Such bleeding invariably resolves slowly and disappears after several weeks There is temporary discoloration, initially red, becoming a greenish yellow shade These hæmorrhages seldom become secondarily infected Adequate sedation is necessary following eye injuries as they are very painful conditions in most cases If a radio opaque foreign body enters the eye a stereoscopic X ray photograph should be undertaken to localise it accurately before any attempt is made to remove it In some instances a foreign body initially thought to be in the eye is found to be extra ocular in position and may be better left alone It is a great advantage to have a pair of high powered spectacles available with which to examine eye cases A slit lamp is most useful in examining the anterior chamber and the cornea for foreign bodies

TROPICAL EYE DISEASES

Brief mention is made of several eye conditions seen almost exclusively in tropical countries Adequate examination of the eye gives a good indication of systemic diseases as seen in all parts of the world Various forms of retinitis and also optic atrophy can be detected by ophthalmoscopic examination In cases of miliary tuberculosis, tubercles can sometimes be seen on the retina Retinal infarcts are also recognisable Iritis may be the first indication of neglected gonorrhœa Tuberculous and syphilitic iritis are seen, which are not primary eye conditions, but manifestations of generalised conditions Ritter's disease, causing chronic conjunctivitis and iritis, is another example of eye signs being indicative of disease elsewhere

Prior to the introduction of synthetic drugs for the treatment of malaria quinine was used almost exclusively in treatment In a small proportion of the cases quinine caused a spasm of the artery of the retina with marked pallor of the retina, and the term " quinine amblyopia ' was used for this form of interference with vision The interference with vision was temporary, usually lasting for a few hours, but in some cases it remained for several days This condition is now seldom seen Little reliance can be placed on eye signs in cases of snake bite as indicating the possible type of snake having bitten the patient In cases of rabies the pupils are almost invariably dilated when obvious clinical signs of this fatal condition are present

Microfilaria can be seen in the anterior chamber of the eye quite frequently in districts where onchocerciasis is prevalent The microfilaria can also be found in the serum expressed from snippings of conjunctiva removed under local anæsthesia Onchocerciasis affects all parts of the eye Patients with leprosy frequently have marked epiphora due to obstruction of the lacrymal ducts where the nasal mucous membrane and lacrymal sac are implicated Some degree of interstitial keratitis is usual in leprosy There is usually other obvious evidence of the disease elsewhere, dry patches of skin with decreased sweating apparent, and alteration in colour, also thickening of palpable nerves (Fig 175) The ulnar nerve is particularly liable to become thickened In leprosy cases the " tear in the eye " appearance is frequently very obvious

In cases of trypanosomiasis there is frequently an acute swelling about the eye without any evidence of injury, seen most commonly in cases of Chagas' disease, South American trypanosomiasis It is less frequently seen with either of the varieties of African sleeping sickness Iridocyclitis is not uncommon in untreated trypanosome cases of all types, though it is seldom looked for Corneal opacities are seldom attributed to sleeping sickness, but it has been noted personally that in treating cases of trypanosomiasis on an experimental basis with 4-4 diamidino-stilbene (Bowesman [4]), that corneal opacities cleared up in a remarkable manner while cases were under treatment with this drug No local treatment was given and these opacities were not originally attributed to trypanosomiasis, but in view of the spectacular improvement with this drug it seems that without doubt they were an eye complication of sleeping sickness The effect of pentamadine drugs

on corneal opacities is much more obvious than that noted when tryparsamide is used in treatment

Blindness is not uncommon as a result of treatment of sleeping sickness with tryparsamide It occurs often quite suddenly after the patient has had about six injections It is more likely to occur if the initial doses of tryparsamide are large (3 gm) rather than when the initial doses are 1 gm, and then 2 gm, and then 3 gm on subsequent injections If this form of blindness occurs optic atrophy becomes apparent, the optic nerve becoming quite white in colour The opinion has been expressed that the blindness associated with treatment of sleeping sickness with tryparsamide is in part due to an associated onchocerciasis, but the condition has been seen on several occasions in districts where onchocerciasis did not exist In some cases of late untreated trypanosomiasis there is some swelling of the optic nerve present causing "choked disc," this is due to an associated meningo-encephalitis Treatment of sleeping sickness with antrypol for three injections and a reduced course of tryparsamide decreases the risk of arsenical blindness During treatment the eyes should be examined regularly to forestall this serious misadventure

Leishmaniasis on very rare occasions causes eye changes, scleritis and corneal opacity with pannus formation If ulcers develop adjacent to the eye ectropion may occur Treatment is by the use of local astringent eye drops while pentavalent antimony is given by injection

Several helminth diseases affect the eyes An adult filarial worm is sometimes seen moving across some part of the conjunctival sac From cases seen it would appear that there is no advantage gained by attempting to remove the worm from this position The worm does little or no harm as it passes across the eye, after crossing in the subconjunctival tissues it disappears into the depths of the surrounding tissues If this is one of many filaria present in the body its removal does not greatly benefit the patient Much damage may be done to the eye if an injudicious attempt is made to remove the worm by dissection An attempt to remove a filaria worm from the conjunctiva under local anæsthesia is therefore not advised

The microfilaria of *Onchocercas volvulus* can be seen in the anterior chamber of the eye They affect the anterior and posterior parts of the uveal tract Appropriate lighting and magnification facilitates their visualisation Where there is blindness due to onchocerciasis there is extensive damage of the retina Marked fragmentation of the retina is seen exposing the pigment layer in many parts There has been much argument as to the importance of this disease relative to blindness in many parts of the tropics Choyce,[5] examining patients in villages in the British Cameroons, found an overall blindness rate of 2 per cent, but he is of the opinion that only 1 5 per cent of the blindness was due to onchocerciasis, which is a very small proportion Nelson,[6] investigating onchocerciasis in the West Nile District of Uganda, found that whereas almost all persons over the age of 6 years were infected with onchocerciasis, in only two out of twelve blind persons in a village was the cause of the blindness attributed to onchocerciasis Rodger [7] was of the opinion that in Ghana onchocerciasis was not a major cause of blindness It has been personally noted, however, that amongst steward boys

recruited from Northern Territories of Ghana those with onchocerciasis, of which there is a large number, have usually got very poor sight These persons are not blind but their visual acuity is reduced to less than 50 per cent in almost all cases

Various methods of treatment of onchocerciasis have been tried The general consensus of opinion is that the most effective drug in clearing the microfilaria of onchocerciasis from the tissues is banocide This drug, however, shows limited success in killing off the adult worms In actual practice banocide causes intolerable itching in patients taking it The usual dose recommended is two tablets 50 mg each three times a day for an adult and proportionally smaller doses for children The discomfort can be much reduced if in addition to the banocide the patient is given an antihistamine preparation Antrypol or germanin (Bayers 205) are less effective in killing off the microfilaria, but they are more lethal to the adult worms It is, therefore, considered that the most suitable method of treating these patients is by a combination of these drugs An initial course of banocide is given, two tablets three times a day for ten days, and this is followed by a course of antrypol injections, 1 gm intravenously weekly for six weeks, while smaller doses are given to children By this course of treatment the patient's condition is much improved The microfilaria disappear from the anterior chamber of the eye and skin tissues It is considered that the course of treatment should be repeated twice or three times a year for at least two years as onchocerciasis is a difficult condition to eradicate completely

The possibility of recurrent infection in districts where the condition is frequently seen must be remembered Ridley [8] carried out a series of observations on cases of this disease and noted

1 Onchocerciasis causes a slow but progressive deterioration in eyesight
2 Swelling of lids, conjunctival injection and photophobia suggest early infection
3 Evidence of the disease can be noted in all structures of the eye
4 Defective vision is particularly apparent in those with many cutaneous scalp nodules
5 Microfilaria easily demonstrated in the anterior chamber of the eye, using slit lamp
6 Unexplained proptosis in an African warrants examination for *Filaria volvulus* (onchocerciasis)

The correlation between the number of onchocercus scalp nodules and eye symptoms is difficult to explain and whether removal of these scalp nodules is of benefit is difficult to say Patients who have had many nodules removed invariably report that they are greatly improved, but this is probably only a psychological effect of treatment

Rare helminthic conditions affecting the eyes are reported from time to time Cœnurus cysts of the conjunctiva have been reported by Cannon [9] This is a small form of hydatid due to the minute tapeworm " multiceps " Gilkes [10] reported a case where a leech adhered to the cornea A young woman was washing in a stream and on washing her face with water lifted in the cupped hands noticed a soreness of the eye A small leech was found attached to the surface of the cornea

due to gonorrhœal ophthalmia neonatorum A small number of cases are due to malignant tumours which are relatively common in young children in the tropics The seriousness of conjunctivitis of whatever origin is seldom appreciated by patients in the tropics Eye diseases are much neglected till the inevitable result is total blindness This still occurs in remote places in spite of the many modern drugs which are so effective in treating eye infections Eye diseases are much more serious in patients suffering from malnutrition than in persons who are well nourished Avitaminosis predisposes to an unhealthy state of the epithelium of the eye, particularly if vitamin A is deficient

If patients come to hospital because of a blind eye, they expect treatment for the eye even though the damage is irreparable in many cases They are reluctant to lose even a blind eye in spite of its unsightly appearance Many patients will agree to the removal of a blind eye if they are offered an artificial one In cases where blindness is due to opacity or distortion of the cornea without serious associated damage of the internal structures of the eye, corneal grafting should be considered, but this is an operation not within the scope of doctors who have not had special training in operative ophthalmic surgery Special instruments are made for the accurate removal of the cornea of the patient to be grafted and the cornea to be removed from the donor eye The success rate of corneal grafting even in skilled hands is given by Mehir, Becker and Oglesby [19] as being between 30 and 50 per cent only The blood types of the recipient and the donor do not appear to make any difference to the success rate of corneal grafting It will be remembered that homografts used in early treatment of burns cases, although they are successful initially, invariably degenerate within two months unless in the case of identical twins

In some instances patients are totally blind although they have a segment of cornea which is not opaque In these cases reasonably good results can be obtained by the employment of a wide iridectomy so that light can enter the eye through the remaining area of the cornea which is clear and pass through the iridectomy opening made By this operation a limited restoration of sight is achieved making it possible for an otherwise helpless person to get about unassisted and attend to many of his personal needs himself

If a patient suffers from a blind eye or panophthalmitis, which is inevitably followed by complete blindness, evisceration of the eye should be undertaken where there is no evidence of malignant disease *An enucleation of the complete eye should not be used in these cases* The sclerotic coat of the eye which remains after an evisceration is of considerable value as it retains the muscles, so permitting movement of the base of the socket and therefore movement of the artificial eye, which is lost completely if an enucleation is employed Evisceration gives a much better post-operative cosmetic result than enucleation

In undertaking an evisceration it should be remembered that the cornea can be removed with much greater ease if a sharp pointed scalpel is inserted into the eye at the edge of the cornea with the cutting edge of the blade placed away from the operator (Fig 298) and *cutting upwards* as the blade of the knife is brought out of the eye over about three-quarters of its length The globe of the eye is held by a good bit of lateral conjunctiva to steady the eye By repeated upward

cuts the cornea can be removed accurately without losing much of the ocular contents If an attempt is made to remove the cornea by *cutting downwards* much of the contents of the eye are expressed and this makes an accurate excision more difficult When the cornea is removed the contents of the sclerotic cavity are curetted out completely The scleral coat of the eye then collapses down on to the base of the socket in a mushroom-like manner The cavity is packed lightly for twenty-four or forty-eight hours After that time the dressing is changed, on the first occasion under intravenous barbiturate anæsthesia

In some cases where panophthalmitis exists there is a small risk of sympathetic ophthalmia causing loss of sight in the other eye If no artificial eyes are available, it may be desirable to use some sort of temporary prosthesis till an artificial eye



FIG 300

Sea shell being used as a temporary prosthesis for artificial eye Dr C B Huppenbauer s case

By kind permission of Ministry of Information, Ghana Government

can be obtained Dr Huppenbauer,[20] my late senior colleague, working in the Gold Coast, 1946, adopted the ingenious method of using well-worn sea shells (Fig 300) as a temporary prosthesis These shells did not cause any damage to the socket because of their well-worn and uniform polished smooth surface This method may be a useful suggestion to those working in isolated places where it is difficult to obtain supplies of artificial eyes just when they are most needed but where sea shells are available

A condition often seen in the tropics which gives great concern to patients of dark complexion is pterygium It seldom causes complete blindness but, as the vascular mass encroaches on to the cornea, part of the field of vision is interfered with The condition therefore needs treatment The constant use of astringent eye drops, zinc sulphate 1 per cent, retards the rate of growth of the condition and is of some value in early cases The rate of growth is increased in cases of conjunctivitis The condition causes disfigurement as the mass encroaches on the cornea If the involved area is excised completely it recurs rapidly in most

instances It is difficult to cover the area with conjunctiva from which the pterygium was excised, though this is the ideal in treatment In order to get over this difficulty it is advised that the pterygium should be partially encircled with an incision through the conjunctiva, which outlines a tongue like area of conjunctiva round this fatty vascular mass, leaving it attached on the side away from the cornea, depending on its position whether medial or lateral on the cornea This lingulate process is then transplanted by partially rotating it to a position beneath the lower edge of the incision in the conjunctiva One fine catgut suture is placed in the transplanted flap to keep it in position In this way the blood-vessels are redirected away from the cornea without being removed and this operation is much less likely to be followed by recurrence than where the mass is removed completely It is seldom possible to cover the denuded area with healthy epithelium It heals by itself

Cataract operations can be carried out with a fair hope of success by doctors who are interested in eye work even though they are working in country stations with limited facilities The operation can be undertaken under local anæsthesia using 4 per cent cocaine eye drops and local anæsthesia in the lids to obviate blinking Pentothal anæsthesia is very suitable for cataract operations Many have been undertaken personally under intravenous anæsthesia It is considered advisable to use cocaine eye drops even though pentothal is employed as the patient is less likely to be restless following operation if this is done If cases are well selected, where the cataract is mature and the conjunctival sac is free from infection, there is a very good chance of success, perhaps 90 per cent A premature attempt to undertake a cataract operation is most unwise Infection is the greatest risk and in many elderly people with cataract there is a chronic conjunctivitis present, probably from a chronically infected tear sac Operation should not be attempted in these cases If infection occurs a poor result is inevitable

One hour before the operation is undertaken atropine sulphate drops 1 per cent are put into the eye The pupil must be well dilated Penicillin drops are also instilled into the eye half an hour before the operation is started Pentothal is administered, 1 gm being suitable The operator sits above the head of the table if he is right handed and about to operate on the right eye In operating on the left eye, it is best to stand on the left-hand side and facing the patient The right hand is thus the outer hand in each case and the patient's nose does not hamper the hand working from the lateral side A straight cataract knife is most suitable for cutting the cornea It is inserted at the outer edge of the cornea at its upper third, cutting edge uppermost, and pressed through to the medial side at the same level By gentle and steady sawing movements the cornea is cut in the upward direction, and as the uppermost part is reached a tongue like flap of conjunctiva is finally cut, attached to the cornea, as the knife is withdrawn The aqueous fluid from the anterior chamber escapes and the iris prolapses a little

If the pupil is very well dilated, it is best to cut the capsule of the lens in its upper third at this stage, very little pressure is required Gentle pressure is then exerted on the eye with a smooth wire vectis at the position of the lower part of the cornea and this dislocates the lens After the lens is out an iridectomy should be performed by lifting up a portion of the iris in the upper part of the wound

with a fine-pointed iris forceps and clipping off a piece with a de Weckers iris scissors If the iris is not well dilated it may be necessary to undertake the iridectomy before incising the capsule of the lens, but the operation is made a little more difficult if the iridectomy has to be made before the lens is removed because of slight bleeding from the iris obscuring the view a little A preliminary iridectomy is necessary in only a small number of the cases After the lens is removed the anterior chamber is washed out very gently with normal saline at body temperature, this removes blood and soft fragments of the lens On dislocating the lens a little vitreous may escape, but in most cases vitreous does not escape, it is better that it should not do so, but to lose a little vitreous is not a catastrophic accident and most cases where this happens heal well without complications If vitreous does escape, no further pressure should be exerted at the lower part of the cornea, otherwise vitreous will be forced out In such cases the lens should be withdrawn with the vectis instead

To complete the operation of "extra-capsular lens extraction" the iris is gently pressed back into position with a blunt spud and the cornea gently replaced Some doctors use a suture in the superior tongue of conjunctiva to keep it in place, others do not No harm seems to come if a suture is not used here Finally a further drop of atropine 1 per cent is put into the eye and also a drop of penicillin and the lids gently closed over the eye A pad and bandage are then applied and left undisturbed for two days, after which time the first dressing is undertaken Intra-capsular lens extraction is a more difficult operation and more likely to be followed by complications, it is not advisable for those to undertake it who have not had special training in the method The extra-capsular operation is not difficult and several have been undertaken personally when working in stations where the services of an eye specialist were not available The desirability of giving antibiotic drugs following operation is obvious as the greatest risk in cataract operations is infection taking place Following cataract operations a strong positive lens must be used, about +4 or +6, in order to compensate for the loss of the normal human lens The use of Ridley's acrylic lenses to replace the lens removed is a refinement which gives admirable results, but should be undertaken only by those expert in ophthalmic surgery

Blindness due to optic atrophy of any type is difficult if not impossible to remedy The use of 5 c c intravenous Ametox weekly has been advocated, but no improvement has been seen personally following its use There is a serious risk of optic neuritis in patients receiving prolonged treatment with arsenical drugs, as was the case where Novarsenobenzol was used in the past in the treatment of syphilis It also occurs in cases of sleeping sickness treated with tryparsamide For this reason it is advisable to examine the eyes of all patients in the tropics who are to be treated with either of these drugs If there is any evidence of optic neuritis or optic atrophy as indicated by colour changes affecting the optic nerve or the optic disc these drugs should be avoided and an alternative form of treatment given

Penicillin can replace arsenic in the treatment of syphilis and the pentamadine group of drugs or antrypol should be used in the treatment of trypanosomiasis If there is evidence of avitaminosis vitamin A by injection should be given, 1 c c

twice a week With illiterate patients who cannot read it is a very useful method of rough eye testing to ask them if they can see an ant at a distance of 2 ft If they cannot see the ant at this distance, it can be taken that there is advanced retinal pathology present No effective means of influencing tryparsamide blindness has been noted, it is a most serious condition

EYE TUMOURS

There are many advanced eye tumours seen in patients in the tropics Patients are brought, in most instances, at a late stage for treatment There is usually conspicuous swelling of the eye as well as interference with the field of vision It is unlikely in such cases that removal of the eye will eradicate the disease completely In almost all cases seen at this stage any operation undertaken can only be of a palliative nature A high proportion of eye tumours are malignant Retinoblastoma is the commonest form of eye tumour Tumours of the glioma type are rare In Ghana, Edington [21] found that malignant eye tumours represented 1 8 per cent of all malignant tumours seen The figure given for eye tumours in Nigeria is 2 4 per cent Malignant eye tumours are seen less commonly in the Africans of Uganda Fig 301 shows a small girl with a retrobulbar tumour which has *completely displaced the eye from the orbital cavity* This sight is not uncommon in West Africa

In many cases of tumour of the eye, recurrence following removal is local only In very few cases have secondary growths been seen following primary malignant growths of the eye In view of this observation it is considered that if an eye tumour is thought to be malignant, the best chance of recovery is afforded if the eye is removed as a subperiosteal resection of all the contents of the orbital cavity starting at the orbital rim and systematically lifting the periosteum from the bone Removal of the eye as an enucleation is quite inadequate and should never be done Recurrence is the rule in over 90 per cent of the cases if the eye is not removed as a complete subperiosteal resection If some tissue can be removed at a level slightly above the position of the optic foramen the chances of completely eradicating the growth are further improved Skin grafting of the orbital cavity is necessary later Retrobulbar tumours are seldom seen at a stage when they are causing visual field defects only but no visible local changes

In rare instances tumours of the lacrymal glands are encountered as seen in Fig 302 A fair proportion of lacrymal tumours are not malignant These can usually be removed completely, as this one was Removal of the lacrymal gland does not necessarily cause a completely "dry eye" on that side These are accessory lacrymal glands of Krause in most patients and they afford a small amount of secretion in the conjunctival sac If, however, a serious degree of dryness of the eye does occur following removal of a lacrymal tumour this can be remedied by the operation suggested by Filatov Lao [2?] used this operation with success The operation consists in transplanting the parotid duct of the corresponding side into the lateral part of the conjunctival sac An incision is made from the outer canthus of the eye to a position close to where the facial nerve emerges from the parotid gland The parotid duct is reached and severed close to its entrance into

the mouth The duct is then sutured into the conjunctival sac and the wound closed There is usually a partial temporary facial paresis after this operation but recovery is complete after a few weeks The composition of the salivary secretion of the parotid gland approximates closely to the composition of lacrymal secretion Following the operation there is usually a slight excess of secretion entering the conjunctival sac but this becomes reduced in time The secretion can be controlled to some extent by the use of atropine This method is an ingenious





Fig 301 Fig 302

Fig 301—Malignant retrobulbar eye tumour displacing right eye
Fig 302—Child with tumour of left lacrymal gland

device for circumventing the loss of an eye where removal of the lacrymal gland is inevitably causing secondary changes which prove detrimental to the eye by reason of unnatural dryness

In order to ascertain the nature of the pathology of the eye tumour, the mass should be bisected after removal, so that a suitable piece of neoplastic tissue can be removed from the uninfected centre of the mass, so affording material unaffected by secondary inflammatory changes due to superficial infection

REFERENCES

1 SCHWENDLER H P (1957) Measles and eye complications —Personal communication
2 THOMPSON F A (1953) Eye signs in vitamin A deficiency in the Ipoh district of Perak Malaya *Trans roy Soc trop Med Hyg* 47 159
3 CHANG J C N (1959) Entropion in Hong Kong *Brit J Ophthal* 43 88
4 BOWESMAN C (1940) A short report on the use of diamidinostilbene in the treatment of human sleeping sickness *Ann trop Med Parasit* 34 217
5 CHOYCE D P (1959) Onchocerciasis and blindness (Correspondence) *Trans roy Soc trop Med Hyg* 53 119
6 NELSON G S (1958) Onchocerciasis in the West Nile District of Uganda *Trans roy Soc trop Med Hyg* 52 368

7 RODGER, F C (1958) Eye diseases in African children *Brit J Ophthal* 42, 336
8 RIDLEY, H (1945) Ocular onchocerciasis including investigations in the Gold Coast Supplement X, p 1, *Brit J Ophthal* 29
9 CANNON, D A (1942) A case of human infection with a species of coenurus *Ann trop Med Parasit* 36, 32
10 GILKES, M (1957) Leech bite of the cornea *Brit J Ophthal* 41, 124
11 CHANG, E (1949) Uveitis of a Cantonese caused by *Gnathostoma spinigerum* *Chin med J* 67, 166
12 RIDLEY, H (1944) Snake venom ophthalmia *Brit J Ophthal* 28, 568
13 MATHUR, S P (1959) Allergy to antivenene serum *Brit J Ophthal* 43, 50
14 DAVENPORT, R C & BUDDEN, F H (1953) Loss of sight following snake bite *Brit J Ophthal* 37, 119
15 JAKSCH, R VON (1897) *Die vergiftungen—specielle pathologie und therapie*, 1, 528 Vienna Holden
16 OETTENGEN, W F (1952) *Poisoning*, p 461 New York Hoeber
17 GUTTMANN-FRIEDMANN, A (1956) Blindness after snake bite *Brit J Ophthal* 40, 57
18 SARKIES, J W R (1951) Ophthalmoplegia following a scorpion bite *Brit J Ophthal* 35, 502
19 MEHIR, P, BECKER, B & OGLESBY, R (1959) Corneal transplants and blood types *Amer J Ophthal* 47, 48
20 HUPPENBAUER, C B (1946) Sea shell as temporary eye prosthesis —Personal communication Gold Coast
21 EDINGTON, G M (1956) Malignant disease in the Gold Coast *Brit J Cancer*, 10, 595
22 LAO, Y -S (1955) Transplantation of parotid duct into the conjunctival sac for treatment of xerophthalmia *Chin med J* 73, 223

29

A Note on Anæsthesia

PARTICULAR CIRCUMSTANCES

THE conditions under which much of the surgery in the tropics is undertaken are, of necessity, far from ideal, yet much good surgery is performed Many surgical cases of an urgent nature come to these small hospitals in remote places for attention Textbooks on anæsthesia are invariably written by experts in this specialty who work under favourable conditions as regards equipment, supplies and assistance In the smaller stations in tropical countries circumstances are quite different Only in the large towns do conditions exist which are *comparable to the large surgical centres in temperate parts of the world* The modern doctor's training ill equips him to deal with the anæsthetic problems which constantly arise in under-developed areas of the world This short chapter is therefore included at the special request of doctors who find many anæsthetic problems which to them are insuperable under the conditions in which they find themselves placed It is proposed therefore to bring to notice situations which constantly arise and which have been personally circumvented by various methods, many of which are the result of trial and error, over many years

It is usual in most tropical countries to have about four or five main centres where a small team of doctors work together All other stations, which provide medical, surgical and obstetrical attention for the remaining four-fifths of the population, are staffed by doctors working only with the assistance of a small nursing and domestic staff which is quite inadequate for the requirements of an enormous district No other doctor is usually available either for consultations or to give anæsthetics As it is not feasible to give a general anæsthetic and perform a major operation at the same time, one is dependent on the services of a " nurse anæsthetist " It is unwise to give an intravenous anæsthetic and then perform the operation in the hope that the patient will not require attention during the time the operation is being performed A nurse anæsthetist must be available to look after the patient It is very usual for the doctor to give a spinal anæsthetic and then perform the operation while a senior nurse stays beside the patient to give assistance should he feel the urge to vomit or spit out Local anæsthesia can also be used by the doctor operating and this form of anæsthesia is of great value The system of nurse anæsthetist is widely employed, but the responsibility for the anæsthesia must be accepted by the doctor General anæsthesia can be undertaken by a nurse anæsthetist on the instruction of the doctor after limited training The method is not ideal but in practice works well If a nurse is asked to give an anæsthetic it is only fair that his full duty time should be devoted exclusively to anæsthetic work, otherwise the standard of anæsthesia must of

necessity remain dangerously low The arrangement of having a special grade made for "nurse anæsthetist" as opposed to nurse alone has greatly assisted surgical work in some parts of the tropics, as such persons *can be employed* exclusively in the theatre and so become much more efficient in this special type of work It is advisable at the early stage of training of nurse anæsthetists for the doctor to induce anæsthesia himself and allow the nurse anæsthetist to continue the administration when full anæsthesia is reached

All persons with a limited training have some difficulty in maintaining an adequate airway throughout the period of anæsthesia If this difficulty were adequately circumvented the administration would be much safer and easier Considering the ease with which this difficulty can be overcome by the use of an endotracheal tube, it is advised that all doctors working in one-man stations should *have an adequate supply of endotracheal tubes, Rowbothams metal mouth pieces*, and a Macintosh's laryngoscope, with a handle which takes U 2 Ever Ready torch batteries as supplied by Longworth Ltd, Abingdon, England The most useful sizes of endotracheal tubes are No 3 for juveniles, No 6 for women and No 8 for men The doctor can anæsthetise the patient and insert the endotracheal tube himself and then hand over to the nurse anæsthetist In due course the nurse anæsthetist can learn to pass the endotracheal tube and soon confidence is gained and the whole procedure managed by the nurse anæsthetist himself under the observation of the doctor My own African nurse anæsthetist, Mr P Solomon, passed an endotracheal tube 284 times in one year, for many other operations an *endotracheal tube was not necessary After using an endotracheal tube on ten* or twelve cases he developed a high standard of skill in this technique The method is not beyond the skill of an intelligent nurse anæsthetist No accidents occurred due to misplacement or obstruction of the tube

The use of endotracheal tubes greatly reduces the risks of anoxæmia It can be inserted either through the mouth or the nostril, if the nasal route is employed a No 4 catheter is most suitable The risk of anoxia is much greater in patients of African origin than those of non-African origin because of the high incidence of sickle cell trait in the former, approximately 20 per cent of the population If there is a rise in the blood CO_2 and a fall in the oxygen level, a sickle cell crisis is very likely *to be produced* and this is most dangerous There is a similar though slightly less risk in patients with thalassæmia and this condition is now known to

[illegible]

widely employed The

[illegible] the high temperature of the climate in the tropics, ether evaporates very rapidly when used on an open mask Mixtures of ether and chloroform three parts to one are more commonly used The mixtures *should be made up fresh when required, as if they are allowed* to stand the ether evaporates much more quickly than the chloroform so causing a relative increase in the concentration of the chloroform

If oxygen is available, it should be given with all general anæsthetics This widens the margin of safety Plastic anæsthetic bottles are an advantage over glass bottles as they do not break if they fall from the anæsthetic trolley In remote places replacement of drop bottles is difficult When a nurse anæsthetist is

administering the anæsthetic the simplest possible methods should initially be employed If closed circuits are used they are very satisfactory in skilled hands Many nurse anæsthetists give excellent anæsthesia with these machines after adequate instruction and some practice In cases of intestinal obstruction where vomiting is liable to occur during the early stage of anæsthesia, the open mask method is much safer, for even though the stomach is initially empty before the administration is started, it frequently fills up by regurgitation of upper bowel contents and vomiting then occurs If a rubber mouthpiece is strapped on to the patient's face with a Clawson's harness, it is difficult to remove it quickly The patient may inhale infective gastric contents which enter the mouth The use of an endotracheal tube reduces this risk It is also advisable during general anæsthesia to tilt the patient slightly head down, so that if fluid enters the mouth from the stomach it is less likely to enter the trachea

Patients in the tropics frequently come to hospital at a very late stage in an illness and in some instances where intestinal obstruction is present the patient's general condition is very weak when he is first seen If the patient's pulse is very fast and poor there is little chance of recovery and the administration of a general anæsthetic further jeopardises the patient's slender chances In such cases a blood transfusion is an enormous advantage, for the poor pulse is in many cases an indication of the presence of hypovolæmic shock In most of these cases the bowel obstruction is followed by a rapid exudation of fluid into the upper bowel and so there is a rapid depletion of the blood volume The shock due to a low blood volume is aggravated by the effect of histamine formed at the site of tissue damage and this further lowers the blood-pressure A general anæsthetic should not be given till the blood volume is restored This is a basic rule to remember This is easily overlooked in view of the difficulty of getting blood for a transfusion in most parts of the tropics If the blood volume cannot be restored by whole blood of the correct type, a blood plasma substitute should certainly be given such as Dextraven or other suitable preparation Gelatin 8 per cent solution is useful for this purpose, if available

Before operation, irrespective of the type of anæsthetic anticipated, the blood-pressure should be estimated and recorded The hæmoglobin level should also be estimated These two factors should both be known before an anæsthetic is given A space has been allowed on the Nursing Record (Fig 14) for this latter finding To know the patient's hæmoglobin level before an operation is started helps in ensuring added care in cases where the patient's general condition and hæmoglobin level are low The margin of safety in anæsthesia is much reduced if the patient's hæmoglobin level is below 50 per cent The patient's blood-pressure is sometimes lowered by the administration of a sedative and in some instances the patient collapses soon after morphia is administered

If patients are admitted to hospital from an area of the country of high altitude and the hospital is in a district of much lower altitude they are liable to collapse under anæsthesia due to altered climatic conditions It is unsafe to "over air-condition" a theatre in the tropics, for this acts in the same way If the temperature and humidity of the theatre are much lower than that existing in the atmosphere outside, the patient sustains a fall in blood-pressure on re-entering the higher

external temperature and humidity after operation A Recovery Room in the theatre has some advantages in this respect for the patient can be stabilised there after a serious operation before being returned to the atmospheric conditions of the wards

Largactil (chlorpromazine) in small doses of 50 mg has some advantages over morphia as a pre-operative sedative, as pointed out by Russell[1] It does not depress respiration It decreases the psychic shock or fear of the operation It decreases the tendency to vomit following operation The amount of anæsthetic agent required to induce and maintain anæsthesia is also reduced when chlorpromazine is used It produces a conscious indifference to perceived pain with a reduction of apprehension and anxiety A dose of 50 to 100 mg is given by injection some hours before the operation is due to start Atropine 1 in 100 gr is given fifteen minutes before the anæsthetic is started It is unwise to give an anæsthetic for at least three hours after a patient is admitted to hospital unless it is imperative because of uncontrollable bleeding This time interval allows the stomach to empty

Compressed oxygen in cylinders is a commodity which is difficult to obtain with ease in many parts of the tropics Cylinders are cumbersome to handle and supplies take many months to reach their destination from centres where the oxygen is manufactured Considering the difficulty in handling oxygen cylinders, it is advised that country stations should be supplied with one large-sized oxygen cylinder 6 cub ft, for where a limited amount of surgery is carried out this will in most cases last for one year It is of little use receiving oxygen in small cylinders It is nearly as easy to transport a large cylinder as a small one To get over the shortage of oxygen difficulty, it was personally found much more convenient to purchase one large oxygen cylinder from a local commercial firm who supplied it for use with oxy-acetylene welding apparatus in motor garages This gas contains 97 per cent oxygen and is quite serviceable for anæsthetic purposes It may be necessary to have an adaptor made to fit the cylinder and the oxygen gauge available

Ether is a very safe anæsthetic if properly used, much safer than chloroform Ether, being very volatile, evaporates very quickly in hot climates It is usually necessary to use at least 8 oz of ether to anæsthetise an adult for an operation lasting half an hour It constantly happens that the supply of ether is low and urgent cases still have to be dealt with Closed circuits have the advantage over open methods of administration in that they are very economical in use of ether A simple Junker inhaler with a hand bellows is a very economical piece of apparatus When the ether supply runs down to one remaining bottle and no more is likely to be available for several days or a few weeks, it is found most practical where general anæsthesia is essential to give the patient a light chloroform anæsthetic and when anæsthetised inject 10 c c of ether into the gluteus maximus muscle This minimal use of ether gives the patient the maximum advantage for no ether is lost and the ether injected counteracts the depressing effect of the chloroform The ether can be smelt from the patient's breath within one minute of being injected It is absorbed rapidly, this is a very practical method when the ether is almost exhausted

The "E M O" (Epstein, Macintosh, Oxford) apparatus is a simple form of closed circuit which is economical in use and satisfactory for use in the tropics Ether and olive oil per rectum can be administered as 4 oz of ether and 4 oz of olive oil It should be well shaken before use to emulsify it The mixture is given per rectum half an hour before the operation is due to start The patient must be given atropine 1 in 100 gr as ether per rectum is excreted through the lungs and causes some bronchial irritation This method achieves only light surgical anæsthesia and if employed it is an advantage to use some local anæsthetic in the tissues in addition No cases of rectal irritation have been noted following the use of oil and ether per rectum Avertin or bromethal given per rectum in the standard doses advised gives a very light surgical anæsthesia The effect is very variable, sometimes it works well, other times not so well If these drugs are to be used they should be supplied in 10 c c ampoules and not from a bottle, as they deteriorate rapidly if exposed to air It is desirable that each dose should be opened freshly and used immediately Drugs of the curare group, used to cause muscular relaxation, are not considered safe for use, unless they are administered by a qualified anæsthetist The same applies to hexamethonium iodide, which is a drug given to produce a lowering of the blood-pressure so desirable in plastic surgery

Those undertaking surgery for African patients over many years are familiar with the frequency with which septic conditions are associated with sickle cell disease The risk of septic infection is increased about twentyfold in patients with the sickle cell trait It is in these septic cases that the precipitation of a sickle cell crisis is so likely to occur following a poorly administered anæsthetic It is advisable in all septic cases to test the patient's blood for sickle cells if the patient is of African origin This is particularly the case with children If this is done much greater care will be exercised in maintaining adequate oxygenation which decreases the risk of a crisis occurring If a patient develops a sickle cell crisis nothing abnormal may be noted on the day of the operation, by the next day the patient collapses and dies unexpectedly about twenty-eight hours after the operation

As the blood-pressure gives a good indication of shock during operation, it is most helpful when working with limited facilities and no other doctor present to have an Accoson Aneroid Wall Model Manometer attached to the wall of the operating theatre On the wide dial the indicator arm shows the blood-pressure, both systolic and diastolic at any time during the operation The large 7 in dial can be seen easily, it is connected to the sphygmomanometer arm band by pressure tubing

Intravenous barbiturate anæsthetics have been a great advantage to doctors working with limited assistance They have, however, also caused a large number of deaths due to their injudicious use in patients suffering from shock The ease with which they can be used and the satisfactory results in most cases makes those using them less cautious than is desirable They have a narrow margin of safety and once injected cannot be retrieved They are most unsuitable anæsthetics for patients who have sustained serious accidents In a high proportion of these patients there has been a serious loss of blood either externally or internally and they are suffering from a much greater degree of shock than is initially appreciated

The lowered blood-pressure is aggravated by the hypotensive effect of the drug injected and these drugs are therefore *particularly* dangerous if used for patients following accidents In these circumstances the necessity of taking the blood-pressure before intravenous barbiturate drugs are given should be appreciated If the blood-pressure is not taken before each intravenous anæsthetic is administered an undue risk is being accepted

Intravenous barbiturate drugs are not suitable for patients with a low hæmoglobin level As these patients with a low hæmoglobin level are already under-oxygenated, prolonged anoxia will certainly precipitate a sickle cell crisis in



FIG 303
Injection being made into the external jugular vein
By kind permission of Mr J K M Quartey, F R C S

patients who show the trait Any patient who suffers from a prolonged period of anoxia is liable to sustain cerebral changes These are seen in mild cases as exhibited by a marked loss of memory which lasts for some months This condition has been noted on two occasions In both cases the patient had prolonged *anoxæmia following intravenous* barbiturate drugs Recovery is very slow and permanent cerebral damage may occur To decrease the risk of depression of respiration following intravenous barbiturate anæsthesia, it is advised that 2 c c of coramine should be added as a routine to each dose of barbiturate drug given This simple measure broadens the margin of safety and is most valuable, it should be made a standard practice and not used in high risk cases only Atropine *1 in 100 gr* can also be added if not already given in the ward before coming to the theatre

In view of the danger of entering the lower end of the brachial artery when attempting to give an *intravenous barbiturate anæsthetic it is advised that* veins

laterally placed should be entered Cases have been reported where a hand has become gangrenous following the entry of barbiturate drugs into the brachial artery close to the elbow inadvertently The veins at the back of the hand may be used if they are easily visible Injection of barbiturate drugs into the tissues alongside the vein is painful, but seldom causes sloughing The Prameta spring tourniquet made by the German firm, Bartels & Reige, surgical instrument makers, Cologne, is an excellent piece of apparatus for use when undertaking intravenous injections of any sort It has an automatic clip which when pressed releases the tourniquet immediately

On rare occasions pentothal does not produce anæsthesia at all when injected intravenously In one remarkable case a healthy young adult African patient was given 1 gm of pentothal intravenously and he showed no evidence of drowsiness or sleepiness whatever He talked perfectly intelligently and did not even feel sleepy Two days later he was given trylene for a minor operation and this also had no effect on him Four days later he was anæsthetised with ether and chloroform, but only with the greatest difficulty This degree of resistance to anæsthetic agents is rare In a small number of cases patients are resistant to spinal anæsthesia On proposing to one patient that he should have an operation under spinal anæsthesia he said, " Spinals don't work with me," by this we took it that the previous spinal anæsthetic was probably not given very well On giving this patient 10 c c of light nupercaine without any difficulty it certainly had very little effect, and the operation was performed with local anæsthesia In these cases it is found that the patient has almost always an abnormally high cerebrospinal fluid protein content

Shieh Yung [2] has used intravenous procaine 1 per cent for light surgical anæsthesia, dolantin 1 mg per c c of procaine used was added From 100 to 300 c c of 1 per cent procaine solution was considered an adequate dose This was administered over a period of one hour given by the intravenous drip method Procaine 1 per cent as a single dose of 10 c c is an excellent analgesic in cases of burns, in order to ease the discomfort of washing the burned area without necessitating giving the patient a general anæsthetic Children can be given 5 c c For each year of age 1 to 2 c c is given and this dosage is considered suitable up to the age of 20 years If a patient has poor veins about the forearm or hand, an intravenous injection can often be given into the external jugular vein without difficulty in most cases The vein is compressed by putting a finger into the supraclavicular fossa (Fig 303) The vein on the right side is usually easier to inject than that on the left side The patient's head is turned to the opposite side *This vein is sometimes useful where a blood transfusion is urgently needed and* the arm veins are collapsed

The effect of different brands of intravenous barbiturate drugs varies considerably Thiopentone has been found particularly active and requires great care in its use Kemithal is one of low solubility and acts rather slowly The effect lasts rather a long time, but the drug is very safe in use The problem of anæsthesia for plastic surgery about the face sometimes arises and if facilities are not available for giving a closed circuit endotracheal anæsthetic which permits the surgeon to work unhampered by anæsthetic apparatus about the face, it has

been found useful in these cases to use a full dose of intravenous barbiturate drug following a limited period of intentional dehydration Fluid is withheld from the patient for eight hours before the operation This has the effect that the patient remains asleep for a prolonged time, permitting of quite a prolonged operative procedure, up to an hour and a half Fluids must then be given intravenously after the operation to help excretion of the drug from the circulation This method works well and is not unduly dangerous, but it must be remembered that adequate intravenous fluid should be given following the operation to facilitate excretion Intravenous barbiturate drugs in anæsthesia have an advantage in plastic surgery in that they are hypotensive drugs and there is minimal bleeding from the operative field following their use The patient must be kept under constant observation till consciousness is regained

Intravenous ether is not a popular anæsthetic Ether boils at a temperature below body temperature, it therefore cannot be given with safety undiluted On one occasion a patient was given 5 c c of pure ether intravenously The result was alarming for there was a sense of vibrating about the patient's chest as though something was bubbling inside him He went to sleep all right and a minor operation was carried out on the right foot It acted like pentothal This is not a safe procedure The incident is related as a matter of interest, to let others know what would happen if the method was again tried It seems that there would be some risk of an air embolism The patient seemed to suffer no ill effects, but the method cannot be recommended If ether is given intravenously in strengths above 10 per cent hæmoglobinuria is liable to be precipitated

Intravenous ether can be given as a 6 per cent suspension in glucose solution Aqueous glucose solution and ether do not mix well but they can be emulsified One pint of the mixture can be given It is necessary to run in the mixture intravenously as a continuous stream through the drop indicator till 400 c c has been given and then reduce the speed for the remaining administration If the mixture is given at the fast dropping rate the patient will not go to sleep This method has the difficulty of inducing excitement while the ether is being given and the patient is liable to disturb the needle in the arm The procedure is not a satisfactory way of administering ether Intravenous alcohol in 30 per cent solution has been advocated by Marin, but the method has the same disadvantages as intravenous ether The vein is liable to be thrombosed by the alcohol entering it It has not been attempted personally

[illegible] essential to use a properly [illegible] Clawson's harness This [illegible] xygen anæsthetic is to be [illegible] vapour to gas and oxygen adds depth to the anæsthetic Gas, oxygen and ether is a very safe method of anæsthesia Cyclopropane has not been used personally

Spinal anæsthesia has done more to encourage surgery in the tropics than any other individual technique Many country patients are quite willing to have an operation so long as they do not lose consciousness Spinal anæsthesia fulfils the patients' wishes admirably and gives adequate relaxation for abdominal and lower limb surgery Spinal anæsthesia must be carefully and properly used

according to the technique recommended by the manufacturers of each preparation This method of anæsthesia is unsuitable for patients with a low blood-pressure due to shock or those with a low hæmoglobin level It should never be used for patients being operated upon for ruptured ectopic pregnancy, to do so would be most dangerous

There is very little alteration in the blood-pressure if a very low spinal anæsthetic is given, as the vasomotor nerve centres in the cord are unaffected by anæsthetics which affect the cord below the eighth dorsal segment This is the case when heavy nupercaine or stovaine are injected in the fourth fifth lumbar space With low spinal anæsthesia it is not essential to give pressor drugs though they may be given without disadvantage Pressor drugs are necessary, if the anæsthetic drug reaches up to or above the tenth dorsal segment, to keep the anæsthetic safe Ephedrine ½ grain or ⅓ grain are suitable given by injection fifteen minutes before the anæsthetic is administered If a dose of ephedrine larger than ½ grain is given the patient is likely to suffer from vomiting and marked congestion of the nose and throat making it rather difficult and uncomfortable for the patient to breathe

It not infrequently happens that doctors arriving at a new hospital in country places find that the anæsthetic spinal drug available is one with which they are not familiar As spinal anæsthetics can be "light," "isotonic" or "heavy" it is essential to know to which category the particular spinal anæsthetic belongs This information is necessary so that the correct tilt can be given to the patient after the spinal is administered in order to regulate the extent of its action If instructions are packed with the preparation the specific gravity is invariably stated and the technique advised is given The specific gravity of cerebrospinal fluid is 1007 Heavy spinal anæsthetics have a specific gravity exceeding this figure, usually about 1025 Light spinal anæsthetics such as light nupercaine are in the level of 1003 It is useful to remember that a spinal anæsthetic preparation supplied in powder form in an ampoule with the intention of mixing this with cerebrospinal fluid drawn from the theca through the lumbar puncture needle must essentially produce a heavy spinal solution as the addition of any crystalloid substance to the cerebrospinal fluid essentially increases the specific gravity in the resultant mixture The risk exists where the spinal anæsthetic is already made up in fluid form and the density is unknown In some instances alcohol may be added and this gives a light type of spinal anæsthetic If the spinal anæsthetic is supplied in liquid form and the specific gravity is not known, it should not be used, as to do so without precise knowledge would be highly dangerous

Reports are received from time to time of unsatisfactory results following the use of sto [illegible] ition, stovaine 1 [illegible] c c , Chaput's [illegible] ½ to ⅓ c c Most of them are small-volume spinals of the heavy type If detailed enquiries are made in cases where complications have been noted, as has been done personally, it will invariably be found that the technique in the administration in all cases was incorrect In order to obtain a good anæsthesia with a small-volume spinal anæsthetic preparation of concentrated type, it is essential to draw up the

anæsthetic preparation into a 5 or 10 c c syringe and dilute this with 4 or 5 c c of cerebrospinal fluid before injecting it into the spinal theca, and this ensures an excellent anæsthetic If the concentrated preparation is injected direct into the spinal theca, it falls rapidly to the lower end of the dural cone, giving patchy anæsthesia about the perineum and inner sides of the thigh The anæsthesia may be of an undesirably long duration In some cases there is prolonged anæsthesia of the anal canal which renders the patient slightly incontinent as he is unable to appreciate the presence of fluid in the rectum and this causes distress to the patient This anæsthesia of excessive duration recovers over a period of one to two months, but is alarming

A point which is seldom made is the undesirability of injecting the total quantity of cerebrospinal fluid withdrawn to mix with the anæsthetic preparation, back into the spinal theca It is very obvious when dealing with patients of dark skin that frequently a small plug of sebaceous material enters the lumen of the spinal needle on puncturing the skin On removing the stylette and drawing cerebrospinal fluid into the syringe this plug of material is drawn into the syringe A photograph has been taken to show this (Fig 304) It is seldom apparent when dealing with patients of light complexion, though no doubt it happens This plug is presumably slightly infective or potentially so and is therefore better not introduced into the confined space of the spinal theca If the last ¼ c c of mixed anæsthetic in the syringe is discarded, the plug remains in the syringe as being heavy it falls to the bottom of the fluid

Most of the fatal accidents with spinal anæsthesia have been encountered when light spinal anæsthetic materials are in use Invariably the accident occurs as a result of the anæsthetic being administered with the patient in the sitting position and the patient not being lowered into the head down position on the table sufficiently quickly, or the patient sitting up himself thinking that that is what is required of him The patient need not be rushed down hastily, but should be placed in the face down lying position within fifteen seconds of the anæsthetic being given A third of a grain or half a grain of ephedrine should be given fifteen minutes before the anæsthetic is given Personally light nupercaine has been used for many years with entire satisfaction, but accidents with it in the hands of others have come to my notice The dose used had been 10 c c as a routine and in cases when upper abdominal surgery was being undertaken 12 c c

The major error causing most of the accidents with this preparation is the erroneous belief that a full ampoule of 20 c c is a normal dose, and this is not the case A dose of 15 c c or over causes a failure of voluntary respiration and is lethal, unless oxygen is administered and manual respiration maintained These large doses of 15 c c and over are used only in exceptional circumstances where thoracic sympathectomies are being undertaken for cases of chronic high blood pressure, and in these cases it is absolutely essential to maintain manual positive pressure oxygenation till the effect of the spinal anæsthetic wears off Gas and oxygen are usually given It is unfortunate that the preparation is put up in this large ampoule as it gives rise to error if used by a doctor not familiar with the proper technique One ampoule can conveniently be used for two cases where several hernia cases are being operated upon on the same morning

The patient should be placed in the prone position with the head of the table slightly lowered. After seven minutes he is turned on to his back by nurses on both sides of the table without the head being raised. After a total of fifteen minutes the operation can be started. During the second seven minutes the abdomen can be prepared and the towels placed in position. The level to which the anæsthetic reaches can be regulated by the tilt of the patient. If the head is kept very low the anæsthetic remains below the tenth dorsal segment giving anæsthesia below the umbilicus only. If he is placed almost level on the table the anæsthesia reaches to the level of the sixth dorsal segment giving anæsthesia to the upper part of the abdomen.

Caudal anæsthesia seems to have no advantage over a low spinal anæsthesia; its administration is very uncomfortable for the patient, and has therefore been used

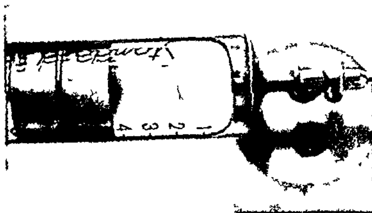


Fig. 304
Minute plug of sebaceous material drawn into syringe with cerebrospinal fluid

personally on very few occasions. It has been made a rule not to use spinal anæsthesia when operating on patients with pressure neuritis following difficult childbirth. This type of leg weakness is seen associated with cases of vesicovaginal fistula most frequently. The use of the spinal anæsthetic may be detrimental to the recovery of the pressure neuritis. General anæsthesia is more suitable in these cases. The patient might reasonably blame the spinal anæsthetic for failure of complete recovery of the leg.

Doctors in the tropics get ample opportunity of using spinal anæsthesia as it is eminently suitable for operations on hernia cases and other forms of lower abdominal and lower limb surgery. Stovaine billon spinal anæsthesia gives one hour operating time approximately. Light nupercaine gives one hour and a half. If longer time is required decicain can be used as it gives up to two hours' anæsthesia. It is seldom necessary to supplement spinal anæsthesia with general anæsthesia. Spinal anæsthesia gives excellent relaxation. If patients are adequately prepared and a pressor drug is given with the spinal anæsthetic where necessary, there is seldom any vomiting.

The calibre of the spinal needle used for the thecal puncture is of importance relative to post-spinal headache Spinal needles vary from 16 standard wire gauge (S W G) to 24 (S W G) the standard size used is No 20 Following the use of a No 22 needle post-spinal headaches are rare, if only one puncture is made and the needle is sharp Post-spinal headache is greatly increased by multiple punctures as it is due to a persistent low pressure in the cerebrospinal system If a No 18 gauge needle is used post-spinal headaches are frequent and severe A No 16 S W G needle is a relic of the past and should never be used as it is a prohibitive size No 22 gauge S W G is an excellent needle, but being of very fine calibre is rather easily bent if a bony surface is struck in introducing the needle A No 24 S W G gauge needle can be used, but is so fine that it has a disadvantage in that the cerebrospinal fluid takes up to one minute to come through it It is therefore a little difficult to know immediately if you have entered the spinal theca The optimum size for use is No 22 S W G calibre when experience has been gained At the earlier stage a size No 20 S W G is the most suitable, being stronger

Howe and Chen [3] made careful records of symptoms following 400 spinal anæsthetic administrations They noted that the overall rate of headache incidence was 22 5 per cent of the cases If a No 18 S W G needle was used 29 7 per cent of the patients complained of headache If a No 20 S W G needle was used 19 7 per cent complained of headache From personal experience it has been found that if a No 22 S W G needle is used the headache rate is only 10 per cent and the headache is seldom severe A 22 gauge needle is therefore most desirable To obviate the difficulty of spinal needles bending when being inserted Dattner made a special needle which has a shaft of approximately 18 S W G calibre It is inserted as far as the ligamentum flava and the stilette is then removed and through the needle a fine lumbar puncture needle is inserted which is about half an inch longer than the original sized needle In this way the fine needle is inserted into the spinal theca without the risk of being bent when penetrating the superficial and deeper ligamentous structures This is a good piece of apparatus

Anderson [4] comments on the value of low spinal anæsthesia for forceps delivery in cases of low and mid-pelvic obstruction Following its use in obstetrics there is much less bleeding than when a general anæsthetic is used The spinal anæsthetic is given by the doctor before applying the forceps A very low spinal anæsthetic only is required and this ensures the lowest possible risk to the infant, who might be adversely affected by a general anæsthetic

Adatia,[5] commenting on painless labour, advocates the use of 0 5 c c of heavy nupercaine given as a spinal anæsthetic between the fourth and fifth lumbar vertebræ No barbotage was used and a saddle anæsthesia of the perineum and inner sides of the thighs resulted This very small dose of heavy spinal anæsthesia *does not* interfere with the activity of the abdominal musculature and so is not detrimental to the normal mechanism of the second stage of labour He lays stress on the importance of inserting the bevel of the needle in the vertical line rather than the transverse The idea being to cause the minimal damage to the theca, for as the main fibres of the theca are set in the vertical line the needle separates the fibres on entering the theca rather than cutting them across, as may

happen if the bevel of the needle is entered in the horizontal line By entering the needle in this way he was of the opinion that headache is less common or severe than if entered otherwise If there is a tear of the perineum following delivery, sutures can be applied after the placenta is removed and no further anæsthesia is required In country stations in the tropics spinal anæsthesia is most useful for forceps delivery as with very limited staff it leaves one nurse more free to attend to the baby

Spinal anæsthetic is sometimes used as a method of aiding paralytic ileus It is noted that where early strangulated hernia is operated upon under spinal anæsthesia the patient's bowels frequently move after the obstruction is relieved, this is an advantage Spinal anæsthesias have also been used in testing the thermal response in the legs in cases where lumbar sympathectomy is anticipated in treatment of degenerative vascular disease If there is an increase in the blood supply of the legs following spinal anæsthesia a good response may be expected following lumbar sympathectomy Spinal anæsthesia has also been advocated as a means of improving chronic ulcers, but the good results claimed for this form of treatment have not been spectacular in my cases where the method was tried Spinal anæsthesia given by the continuous method is liable to complications because of the risk of displacement of the needle in the spine during the time of the operation The method has been used personally on several occasions We had an area of metal cut out of our operating table for the purpose of trying the technique, but there does not appear to be any advantage over a single dose spinal administration

For patients in poor general condition it is in some cases an advantage to employ an "epidural anæsthetic" This technique has a limited use, it is suitable for poor-risk patients, as there is no lowering of the blood-pressure associated with it The anæsthetic is given putting the solution to be used into the space between the theca and the spinal bone segments, it does not enter the theca at all The spinal anæsthetic is administered with the patient in the left lateral position initially The lumbar puncture needle is inserted as far as the ligamentum flava The stilette is then removed A sterile U tube containing sterile normal saline is then attached with a suitable fitting to the lumbar puncture needle The lumbar puncture needle, now with no stilette in it, is advanced a further half-centimetre and when the point of the needle enters the epidural space a negative pressure is encountered as indicated by the saline in the U tube rising on the side of the lumbar puncture needle Once the epidural space is entered the U gauge is removed If a U tube is not available it is equally good, after passing the lumbar puncture needle to the spinal ligament, to put a large drop of sterile water into the mouth of the needle from which the stilette has been removed The drop of water remains almost hanging from the entrance of the needle As the needle is advanced it will be noted that the drop of water suddenly retreats into the mouth of the needle as the epidural space is entered because of the negative pressure present in the space A volume of 10 c c of 2 per cent novocaine is then injected slowly into the epidural space, the syringe is removed and the stylette is re-inserted The patient remains in the left lateral position with the needle remaining in position Five minutes later a further 10 c c of 2 per cent novocaine is injected After a further five

minutes the patient is turned over on to the other side, the back being kept uppermost so that the needle is not disturbed A further 10 c c of 2 per cent novocaine is similarly injected on two occasions at five-minute intervals The needle is then removed and the patient kept lying on the back Anæsthesia comes on slowly and the patient is ultimately ready for operation thirty-five minutes after the first injection is given The anæsthetic lasts for up to about two and a half hours and gives good anæsthesia The method though good is very time-consuming and is therefore not popular It is very useful in a limited number of poor-risk cases, where other methods are not considered suitable

Local anæsthesia has a great use in tropical surgery Novocaine 1 per cent is most popular, but personally novocaine ½ per cent is preferred in most instances With the weaker solution very large quantities can be injected without being dangerous A single dose of 10 minims of adrenaline is added to the total volume of novocaine put out This is sufficient to cause adequate vasoconstriction and the patient seldom receives more than two-thirds of this dosage The technique of local anæsthesia is admirably set out in the monograph of Corlette[6] This is a very useful book for surgeons in the tropics Where local anæsthesia is used the tissues must be handled very gently and this is in itself an advantage particularly when operating on thyroid cases Gray's metal local anæsthetic syringe is of strong construction so that the anæsthetic material can be injected under high pressure without danger of the syringe getting damaged The needle has a bayonet fitting which prevents it becoming detached Glass syringes are liable to be damaged if high pressure is used to make the injection in certain areas of the body such as the scalp and the skin about the scapular areas The "cartridge type" of dental syringe is very useful not only for dental work, but also for minor surgery The needles are of very fine calibre and the anæsthetic material is supplied in sterile rubber-capped tubes which fit the syringe In countries where the hæmoglobin level is on an average low, it should be made a routine to have a bowl of ½ per cent procaine with adrenaline added placed on the operating table The line of incision is infiltrated and the deep tissues injected as required If the patient is under a general anæsthetic a solution of adrenaline in water can be used for the hæmostatic action of the adrenaline, this reduces blood loss

The method of brachial plexus block for arm anæsthesia has been used on only a few occasions There are few instances in which it has any advantages over general anæsthesia in limb surgery In any form of local anæsthesia it is better to use larger quantities of weak solution rather than small quantities of strong solutions Setting of fractures under local anæsthesia gives satisfactory results As many cases of obstetrical obstruction calling for Cæsarean section are seen in the tropics the question of anæsthesia for these cases frequently arises If the condition of the mother and the infant are both good and Cæsarean section is indicated general anæsthesia may be used General anæsthesia is, however, detrimental to an infant in poor condition, as it not only suffers from the distress of the labour, but has the additional burden of anæsthesia superadded Ashworth,[7] working in a country station in West Africa, considered that pentothal 1 gm given to the mother when the surgeon was ready to operate was most satisfactory The baby was removed quickly before it was adversely affected by the barbiturate

drug There was very little bleeding when this method was used Many doctors trained on the Continent of Europe adhere to the practice of using local anæsthesia for Cæsarean section, considering it most satisfactory Nolan,[8] who has a very extensive experience of obstetrics in tropical Africa, prefers local anæsthesia for Cæsarean section A solution of 2 5 per cent is used and up to 40 c c injected if required As the baby is removed from the uterus the mother is given ¼ gr of morphia intravenously This ensures the maximum vigour of the child and minimal bleeding and relieves the mother adequately Local anæsthesia is also most useful when undertaking symphysiotomy and is more suitable than general anæsthesia, as the patient is then capable of exerting some voluntary abdominal pressure when required

Krause's local anæsthetic needle is most useful for inserting local anæsthetic solutions in deep sites It is 6 in long and was originally made for injecting the cœliac ganglion when undertaking abdominal surgery under local anæsthesia It is very useful for injecting the tonsil bed when undertaking tonsil dissection It can also be used with advantage to inject local anæsthetic solutions and adrenaline in vesicovaginal fistula cases Injection between the layers of tissue in these cases facilitates *separation*

REFERENCES

1 RUSSELL, J T (1956) Chlorpromazine hydrochloride in anæsthesia *S Afr med J* 30, (1), 529
2 YUNG, S (1956) Intravenous procaine—dolantin in surgical anæsthesia *Chin med J* 74, 456
3 HOWE Y L & CHEN, C E (1951) Headache following spinal anæsthesia *Chin med J* 69 251
4 ANDERSON, A F (1946) Spinal anæsthesia for forceps delivery in abnormal labour *J Obstet gynæc Brit Emp* 53, 347
5 ADATIA, M D (1955) Painless labour *J Obstet Gynæc India*, 5, 371
6 CORLETTE, C E (1948) *A surgeon s guide to local anæsthesia* Bristol Wright
7 ASHWORTH, F (1957) Anæsthesia for Cæsarean section Personal communication Ghana
8 NOLAN, M M (1950) Some obstetrical problems in tropical Africa *Irish J med Sci* p 43

The Surgery of Filarial Diseases

TISSUE WORMS

THE term filariasis is given to a group of conditions in which various forms of tissue worms affect the body. These diseases are transmitted from man to man by various insect vectors which act as intermediate hosts. In the case of *Filaria bancrofti* and *F. malayi* mosquitoes carry the disease. *F. loa* is transmitted by the fly Chrysops. *F. perstans* and *F. mansonella* are both spread by Culicoides midges. *F. volvulus* is carried by the large gnat Simulium. Guinea-worm disease is perpetuated by the water-flea Cyclops. There are seven well known filarial diseases all of which give rise to a varying degree of low-grade ill health. Some forms of filariasis cause serious complications which require surgical treatment. The following list sets out the various filarial worms and gives details which are useful in identifying the type of parasite implicated in clinical cases.

Name	Adult	Vector	Microfilaria	Period	Sheath	Tail	Nuclei
F. bancrofti	Cuticle smooth	Mosquito	In blood	By night	Present	Tapering	Almost to tip
F. malayi	Unknown	Mosquito	In blood	By night	Present	Thread like	Two nuclei in tip
F. loa	Cuticle bossed	Chrysops	In blood	By day	Present	Tapering	To tip
F. perstans	Head appendages	Midges	In blood	None	Absent	Blunt	To tip
F. mansonella	Cuticle smooth	Midges	In blood	None	Absent	Pointed	Almost to tip
F. volvulus	Cuticle annular markings	Black gnats	In skin and conjunctiva	None	Absent	Blunt	Almost to tip
D. medinensis	Length 2 ft	Water fleas	Extruded from skin blister	None	Absent	Tapering	None

Filarial diseases have a very wide distribution throughout the tropical and sub-tropical world, and if this is not appreciated there may be much difficulty in explaining the cause of a pyrexia due to any of these diseases. Following any surgical operation there is a marked disturbance of the hæmopoietic system, and with increased activity during convalescence patients who have a latent filarial infection are liable to develop a low-grade fever. The necessity of making appropriate examinations for the detection of these diseases is obvious. Blood examination during the day and night is necessary for the identification of the

type of filaria where the blood stream harbours the microfilaria In the case of *F volvulus* skin snippings should be taken so that the serum expressed from these can be examined under the microscope for the microfilaria When microfilaria is present in the blood it can be detected most easily when wet blood preparations are examined rather than dry blood slides which have been stained With the former a relatively large quantity of blood can be examined at once The movement of the live microfilaria is easy to appreciate This method is also used as being the best method of detecting other live parasites such as trypanosomes in sleeping sickness and spirochætes in relapsing fever If wet preparations are positive then films should be made in order to identify the type of microfilaria present The presence or absence of a sheath and the distribution of the tail nuclei are characters which help in the identification of the individual types The periodicity of the microfilaria will in some cases give an indication of the type of filaria which may be expected One tablet of banocide given to a patient one hour before a blood examination is made for filaria increases the chance of finding the parasite

In all forms of filariasis there is a marked tendency for the adult worm to become localised in the tissues after a limited period This precipitates an inflammatory reaction which ultimately results in the formation of nodules in lymphatic glands in the case of *F bancrofti* and *malayi*, and in the skin in the case of *F volvulus* Associated with the localisation of the adult worms in the tissues the various surgical complications of filariasis occur *F bancrofti* and *malayi* give rise to elephantoid complications at various sites in the body as well as pendulous lymphatic gland masses about the groins while *F volvulus* causes an unhealthy condition of the skin with nodules in the substance of the skin Burch, Qualls and Greenville,[1] working in Liberia, noted the distribution of skin nodules in cases of *F volvulus* to be as follows

About the femoral trochanters	181
About the coccyx	158
About the iliac crests	119
About the anterior superior spines	44
About the sacrum	33
About the ribs	27
About the head	11
About other places	few

Many of the patients had nodules in several places, the examinations were made on 395 patients, hence the greater number of nodules noted than patients examined The overwhelming proportion of skin nodules are found about the pelvic area of the trunk The areas about the great trochanter of the femora showed the highest number of any individual site In undertaking skin snipping examinations for this form of microfilaria, it is usual to find that the lower the site of the body examined the higher the number of positive results obtained Serum is examined from small areas of skin which are snipped off with a pair of scissors The skin of the calf of the leg gives a very high number of positive results The calf is a site which is convenient to clean and grip with a forceps particularly about the position of the neck of the fibula Active *Microfilaria volvulus* can be seen in many

patients with this infection if the anterior chamber of the eye is examined with a strong hand lens and a good light projected from a lateral position Microfilaria can also be found on removing a small snip of *conjunctiva after* 4 per cent cocaine drops have been put into the eye to facilitate this minor operation

M bancrofti has a night periodicity The worms are found most easily in the peripheral blood between 9 and 11 P M In view of the difficulty with which the microfilaria traverse the capillary field, it has been found that their incidence *is very high in* capillary blood The best method of extracting them from this site is by scarifying the skin and expressing serum as recommended by Van den Berghe and Chardome [2] Wet preparations and stained films are made and examined Alhadeff [3] considers that the microfilaria can be found most easily by mixing 1 drop of peripheral blood with 2 drops of water and examining the preparation under the low power of the microscope Jordan,[4] working in East Africa, comments on the observation that there is a very high incidence of microfilaria found in the blood of patients who suffer from any form of tissue damage, this is particularly the case in patients who sustain an abortion and in accident cases where wounding has occurred The incidence of microfilaria in these patients is much higher than that found in the general hospital population admitted for treatment of other conditions The incidence of filariasis varies greatly from place to place In view of the high incidence of microfilaria in certain animals, particularly dogs and monkeys, it is thought that animals may be a primary source of these diseases Heisch, Nelson and Furlong,[5] *investigating filariasis on the Island of Pate, five* miles off the coast of Kenya, found that 32 per cent of the persons examined showed microfilaria in night blood, while only 4 per cent showed microfilaria in day blood, the relation of the two types being 8 to 1 The highest rate of infection was noted in patients between the ages of 16 and 20 years Burch and Greenville [6] noted in West Africa *that the incidence of nocturnal microfilaria to diurnal types* was 6 to 1

The *M loa* has a diurnal periodicity It gives rise to large urticarial patches termed " Calabar swellings " The presence of these allergic swellings is alarming to patients and if an area is involved close to the larynx there may be some interference with respiration This complication is best treated by measures appropriate to allergic conditions Intravenous calcium gluconate is beneficial, antihistamine drugs also help A small dose of adrenaline (5 minims) is useful in some cases *Filaria loa* is also the form of filaria in which the adult worm is well *known to move across the subconjunctival* tissues of the eye The worm is best left alone in this position, as it moves away without doing any permanent damage If an attempt is made to remove it surgically serious damage may be inflicted on the eye without any particular advantage being gained Larva migrans is due to various forms of subcutaneous worm infection This condition is troublesome, giving rise to marked irritation It commonly affects the limbs Treatment by X-rays and freezing with ethyl chloride or carbon dioxide are in some cases beneficial, while in other cases they are ineffective Moons [7] points out the efficacy of D D T spray in the treatment of *larva migrans The area of* skin over the worm is lightly scarified and D D T spray (Neocid-Geigy) applied D D T is known to penetrate the skin in small quantities, it is extremely poisonous and

minute quantities reach the worm and kill it Animals treated with D D T for skin parasites have been killed by its use—dogs and cats particularly

A course of hetrazan should be given to patients with *F loa* Most of the European patients in whom *F loa* has been detected personally have been resident for some time in Southern Nigeria where the incidence of the condition seems to be much higher than in other areas in West Africa

F perstans is a form of filariasis with which few, if any, complications are associated Its rate of incidence varies greatly in different places, in some places as much as 50 per cent of the population being infected, while in other places not far distant, the incidence is below 5 per cent

Many drugs have been used in an attempt to eradicate filarial diseases, but with limited success as they are difficult to cure Opinion is generally in favour of diethylcarbamazine, also termed dicarbamazine (Hetrazan or Banocide), as being the most effective drug in killing off the microfilaria It does not kill the adult worms Antrypol is also useful in treatment of filariasis, it is moderately effective in killing the adult worm though less effective in destroying the microfilaria The type of treatment favoured in adults is therefore a preliminary course of diethylcarbamazine, two tablets three times a day for a week to ten days, followed by the injection of 1 gm of antrypol weekly for five weeks As diethylcarbamazine gives rise to intolerable skin irritation it is advisable to use antihistamine drugs also while it is being administered This is the case particularly in patients with *F volvulus* The combined courses should be repeated three or four times a year for two years

Jordan[8] carried out a pilot scheme to eradicate *F bancrofti* from Ukara Island in Lake Victoria, East Africa Dicarbamazine was used His patients were divided into three comparable groups in different nearby areas so that the conditions of the experiment should be very similar in each group The best results were achieved when patients were given one 200 mg tablet once per month of dicarbamazine for a period of one year Positive cases in this group were reduced from 100 per cent to 19 7 per cent after twelve months' treatment A second group were given one 200 mg tablet per month on alternate months and the final result was a reduction from 100 per cent to 39 per cent at twelve months This method was less efficient A third group were given one 100 mg tablet monthly for the twelve months and after this period 32 per cent were still positive after one year's treatment This drug has limited success in treatment of *F bancrofti* infections It is a very difficult infection to eradicate

Conran and Waddy[9] noted the effect of treatment with antrypol in persons suffering from gross defect of vision due to onchocerciasis They considered that this drug was the most effective in treatment of this form of ophthalmia Using a course of 1 gm intravenously each week for five weeks the vision was brought from perception of light only initially to 6/36 vision This was a very satisfactory achievement

Guinea worm or *Dracunculus medinensis* is a form of tissue worm or filaria with special characters which are sufficiently distinct to warrant a separate section for its description

ELEPHANTIASIS

The presence of microfilaria in the blood or skin tissues gives rise to very mild constitutional symptoms in the early stages of the infections Patients often retain good health for many years before showing any evidence of complications The seriousness of filariasis ultimately depends on the complications to which it gives rise Each type of filaria has characteristic secondary manifestations Elephantoid conditions of all types are caused by *Filaria bancrofti*, *F malayi* in addition causes lymphœdema in parts of the Far East

The precise mechanism of elephantoid conditions has not so far been clearly elucidated Elephantiasis of the leg is usually unilateral which strongly suggests that there is some local element in the part itself interfering with the hydrodynamics of the limb There has been a tendency to regard filarial elephantiasis of the leg as being a condition due to lymphatic obstruction alone, but there are many points which conflict with this theory If a patient with elephantiasis of the leg is put to bed and the lower limb elevated for four weeks the leg returns to dimensions closely approximating to normal On again assuming the upright position the condition slowly recurs during the next two or three weeks If it was due to obstruction in the groin glands alone one might expect a uniform swelling of the lower limb throughout its entire length It is a common observation, however, that swelling of the lower limb due to filarial elephantiasis irrespective of its duration does not reach higher than the level of the neck of the fibula (Fig 305)



Fig 305
Elephantiasis of the left leg due to *Filaria bancrofti*

Elephantiasis is frequently aggravated by attacks of lymphangitis There is a considerable possibility that what is thought to be lymphangitis is an allergic condition due to an escape of blood serum into the lymphatic field and not an infective condition at all There is strong clinical evidence to suggest that the swelling is due to a raised osmotic pressure as a result of abnormal protein locally rather than an obstructive lesion The constancy with which the swelling reaches the level of the head of the fibula irrespective of its duration seems to indicate that the osmotic pressure of the presumed abnormal protein present is capable of lifting fluids to this level only As with individual trees which grow to a characteristic height depending on their type and the composition of the salts they extract from the soil, so here, too, the protein of the lymphœdema has a characteristic composition and osmotic pressure which is capable of lifting the fluid to the level of the knee only

An experiment was carried out by Bowesman[10] in which 3 c c of 10 per cent sterile glycerin solution was injected into the femoral artery weekly for four weeks to see if fluid could be brought back into the vascular system by the presumed hydroscopic action of the glycerin The patients were encouraged to continue normal activities as usual, they were not encouraged to rest during the treatment In all cases treated the size of the elephantoid leg was much reduced in calibre by this procedure Measurements were taken at different levels before and after treatment The alteration in size was also confirmed by the use of an oncometer The method of treatment was simple and the patients were uniformly satisfied with the improvement The limbs remained much smaller in size for several months, but gradually returned to their previous dimensions The experiment was of interest Mehta[11] subsequently observed a series of cases treated in this way in India and confirmed the beneficial effect of this form of treatment He used 10 c c of 50 per cent glycerin by the intra arterial route with very good results in many cases No complications were noted in my cases, other than a temporary discomfort down the leg This pain, due to arterial spasm, is decreased if preliminary sedation is given In those treated in India, transient hæmoglobinuria was observed in some of the patients This finding was not considered serious Glycerin given by the intravenous route, which might be considered more convenient and easier, was less beneficial than when given by the intra arterial route, 20 c c of 50 per cent solution can be given twice a week intravenously

It is a common observation that elephantiasis essentially affects dependent structures of the body, the limbs, the male genital organs and the female breasts The element of gravity is undoubtedly a basic factor in the location of the swellings As lymphœdema can be drained slowly over several weeks by removing the element of gravity by elevation of the affected part, there is little doubt that elephantiasis is not primarily due to lymphatic obstruction alone It is personally considered that the pathological change which occurs in the lymphatic glands draining the part implicated is an inflammatory change The presence of degenerating filarial worms in the glands is causative of the pathology This gives rise to damage to the vascular supply of the glands which permits of a leakage of blood serum from the blood vascular system into the lymphatic channels The serum escaping is of a much higher osmotic pressure and density than the normal lymph, it therefore descends, passing down the lymphatics to the base of the lymphatic field, that is in the reverse direction to the normal flow of lymph This serum exerts an osmotic effect which ultimately produces gross lymphœdema Elephantiasis should therefore be considered not as an evidence of lymphatic obstruction primarily, but as a serum leakage into the lymphatic field

The condition of chyluria is an example of an obvious leakage of serous fluid from ruptured varicose lymphatic channels into the urinary bladder The site of the lymphœdema is determined by the distribution of the lymphatic field drained into the particular gland or glands involved Fig 306 illustrates diagrammatically the suggested course of seepage of serum following lymphatic gland damage due to filariasis As certain glands receive lymph from more than one skin area combination syndromes are easily understood

Several methods of operative treatment have been employed from time to

time in an attempt to cure elephantiasis of the leg The method of drainage of the superficial lymphatics into the deep lymphatic field has been tried without permanent success by Sampson Handley in England, Lanz in Holland, Rosenow

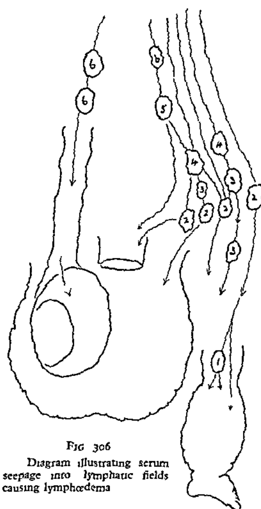


Fig 306

Diagram illustrating serum seepage into lymphatic fields causing lymphœdema

1 Popliteal glands · *4 External iliacs*
2 Superficial inguinals · 5 Common iliacs
3 Deep inguinals · *6 Para aortic glands*

in Russia and Kondeleon in France, such an extensive trial of the method by eminent surgeons indicates that the operation is not of permanent value It has been undertaken personally *on about six occasions and is considered* useless The incision in the lateral aspect of the leg from the ankle to the knee which cuts through the lymphœdematous tissue in order to expose the deep fascia and remove part of it permits of a great loss of fluid from the leg during and immediately *after the operation* Temporary benefit is gained by this incision, which lets out much gelatinous fluid, and the subsequent rest enforced by the hospitalisation

during convalescence The fluid which comes out of the wound clots into a jelly-like mass on standing, unlike pure lymph

The most satisfactory treatment for elephantiasis of the leg due to filariasis is to remove extensive skin grafts from the elephantoid part of the leg with a good skin graft knife (Braithwait's pattern is recommended) and then, having placed these aside, excise the complete elephantoid mass A circular incision is made at the level of the top of the swelling and another round the foot about 2 in from the level of the sole of the foot All the intermediate skin and lymphœdematous tissue down to the level of the deep fascia is then excised completely Adequate hæmostasis is essential The tourniquet is then removed and the grafts applied By using a tourniquet during the operation very little blood is lost The leg is then dressed with vaseline gauze and wool and bandages applied A blood transfusion should be given after the operation as some loss of serum in the dressings is inevitable Considering the massive enlargement of the leg it is not difficult to remove sufficient skin to cover the denuded area Immediate skin grafting with grafts of a large size makes the operation a practical proposition Appropriate use of antibiotic drugs prevents serious surface infection As the skin incisions involve the area of the foot, it is wise to give an adequate dose of antitetanic serum following operation because of the risk of tetanus following operation in patients who do not have adequate foot protection with shoes



Fig 307
Elephantiasis of the leg of non filarial type Milroy's disease

In the case of non filarial elephantiasis of the legs, sometimes termed Milroy's disease, it can be seen (Fig 307) that the enlargement is uniform, extending up to the groin This condition is probably due to a partial lymphatic obstructive condition about the groin glands on one side The somewhat similar congenital form of elephantiasis (Fig 308) is occasionally seen This condition is undoubtedly due to a congenital abnormality of the lymphatics about the groin

Operations designed to reduce lymphœdema of the leg by the introduction of silk threads from the lower leg to the lower abdominal wall are considered to be unsound in principle and not of value The procedure of lymphatic grafting by transferring a flap of skin from the arm to the leg to bridge the gap between the thigh and the lower abdominal wall is also unsound, it is based on the assumption that elephantiasis of the leg is due to a lymphatic obstruction in the groin glands alone The operation is dangerous, as it is very liable to become grossly infected

All pedicle grafts in the tropics where adequate fixation is difficult and most irksome under tropical conditions of temperature and humidity are unsatisfactory Having tried this procedure a few times many years ago it was given up as being dangerous and not of value

Genital elephantiasis in the male assumes different characters depending on whether the skin of the penis alone is involved (Fig 126), the skin of the scrotum alone (Fig 309), or the cord and testicle alone Combinations of these three forms are very usual (Fig 310) The site of the elephantoid change is determined by the site at which pathology exists in the course of the lymphatic drainage of these parts Various clinical appearances are presented depending on the degree to which each part is involved Fig 311 shows a patient with elephantiasis of the scrotum and double hydrocele The diagnosis of elephantoid conditions is not difficult



FIG 308



FIG 309

Fig 308—Congenital elephantiasis of the leg in an infant
Fig 309—Elephantiasis of scrotum alone No hydroceles present in this case

In some instances cases of large hydrocele are sent to surgical clinics as elephantiasis of the scrotum If hydroceles alone are present the skin of the scrotum is normal and the veins can be easily seen on its surface If elephantiasis of the scrotum is present the texture of the skin is altered and it pits on pressure and veins are not visible, the skin cannot be moved freely over the underlying structures Herniæ must also be distinguished and differentiated The normality of the skin over the herniæ and their reducibility are characteristic features

The most effective method of treatment of genital elephantiasis is the removal of the lymphatic field involved in its entirety The treatment of the underlying disease by appropriate antifilarial drugs should also be considered to decrease the risk of further complications in other parts of the body

In early cases of elephantiasis of the skin of the penis alone patients sometimes come to hospital requesting circumcision because they notice the thickening of the skin of the prepuce It is most important in these cases that circumcision according to the standard technique should not be undertaken for by so doing much of the inner layer of skin of the prepuce is removed and this tissue is valuable for covering much of the shaft of the penis so permitting of a " basal circumcision ' If the inner layer of skin is retained all of the elephantoid skin of the penis can be

removed without a skin graft being necessary (Figs 1^6 and 127) The inner layer of skin of the prepuce does not become involved in the lymphœdematous process irrespective of the degree of involvement of the external skin of the penis or the skin of the scrotum No cases of lymphœdema of the body of the penis hav^ ever been noted this is probably due to the highly specialised vascular mechanism of that structure

In undertaking operations for the cure of elephantiasis of the penis and scrotum spinal anæsthesia is eminently suitable The enormously enlarged scrotum with massive hydroceles associated in some cases is found to have a very large blood supply The hæmorrhage is very severe if special methods are not adopted to reduce this If a tourniquet is used round the base of the scrotum



F G 310



F G 311

F g 310—Elephan a s of penis and scro um
F g 311—Elephan ias s of the scrotum w h large hyd oceles present in add u n

as a means of controlling the bleeding it is not possible to remove sufficient skin t ssue to prevent the recurrence of the condition in the perineal area The use of a tourniquet is therefore contraindicated It is essential to remove all skin from the position of the base of the penis above to 1 in from the anus below, thus taking away in addition to the skin of the penis and scrotum the skin of the perineum over most of its extent The lateral perineal incisions should be made not more than 1 in from the cruro scrotal folds The most efficient method of reducing blood loss is to take advantage of pooling of the blood in the patient s legs by allowing the lower limbs to hang down over the s des of the table in the abducted position during the operation (Fig 312) This position also allows more room for access to the perineal position wh le operating Towels can be arranged on the lower end of the table more easily

It is an enormous advantage to inject the tissues about the pubes groins
of 1 in 400 000 adrenaline in
This solution when injected
ecessary to use a long lumbar

puncture needle to inject the scrotum and perineum, entering the needle close to the position of the external inguinal rings on each side The spermatic cord is first exposed through a 3 in inguinal incision on each side centred over the external inguinal rings If there are large hydroceles present in the scrotum it is an advantage to tap the hydroceles through the incisions before withdrawing the testicles In many cases even though the scrotum is grossly enlarged the testicles may be within normal limits of size (Fig 313) and no hydrocele present as in this case In such cases it is not necessary to open the tunica vaginalis If a hydrocele is present the sac should be opened and reversed If there is much thickening present partial excision of the sac should be undertaken

The testicles, having been extracted on their cords, are placed on the lower abdominal wall and a clean sterile towel placed over them The lower end of the



Fig 312

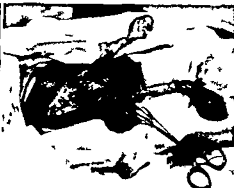


Fig 313

Fig 312—Position of patient on table at operation for elephantiasis of the scrotum
Fig 313—Testicles shown attached on cords placed on abdominal wall during operation

inguinal incisions are then joined by an incision placed above the level of the base of the penis close to the infrapubic angle A circular incision is then made in the skin at the position corresponding to the external preputial orifice so that the internal skin of the prepuce attached to the glans penis can be retained while all the remaining skin of the penis is removed The centre of the transverse incision above the base of the penis is then joined to the centre of the circular incision at the external urinary meatus, this allows of clearance of all the skin from the shaft of the penis Great care must be exercised so that damage is not inflicted on the urethra The insertion of a urethral sound is helpful in identifying the structure and so preventing damage at a position close to the perineum

The scrotum is next turned up on to the lower part of the anterior abdominal wall Two incisions are then made with a sharp scalpel on each side of the perineum (Fig 314) starting 1 in above the anus and running laterally 1 in away from the cruro-scrotal fold As the tissues are under tension, the incisions open immediately into a butterfly appearance If adrenaline solution is used in the tissues the skin incisions look quite white and bleed very little Deep to these incisions beneath the deep fascia there are many large veins running from the scrotum to the deep pudendal area The incisions are then carried up to join the

inguinal incisions On incising the deep fascia the scrotal veins are exposed These are gripped between forceps before being cut they are then severed and ligated

It is possible to remove the scrotum by next cutting through the lymph œdematous tissue on each side For this purpose a short amputation knife is most suitable as the blade is strong It is much more suitable than a scalpel Hæmostasis is attended to as required There is invariably one large central vein running up from the scrotum beneath the urethra It is this vein which becomes thrombosed in cases of gangrene of the scrotum as already referred to After removal of the scrotum the area is well washed with warm saline

The testicles are next transplanted into the thighs A skin pocket is opened up under the skin of each thigh The entrance is made in the lower inguinal area



FIG 314
Initial incisions on perineum made with the scrotum turned on to lower abdomen

At this position the superficial external pudendal vessels are encountered—an artery and two veins, these should be systematically clamped, divided and ligated A long pair of scissors angled on the flat are most suitable for opening up the skin pockets They are inserted between the skin and the deep fascia of the thigh The scissors are insinuated down the thigh for a depth of 6 in and the blades separated while held in different positions, so loosening the tissues It is necessary to have the entrance to the pocket at least 2 in wide so that the testicle can be squeezed through it It is easier to make these pockets while standing on the opposite side of the table to that being operated upon, than necessarily standing on the right side of the patient all the time These pockets need not be drained, but it is essential to see that hæmostasis is adequate before inserting the testicle Both testicles having been transplanted the perineum is then closed by insertion of nylon stitches about half an inch apart All layers are incorporated in this stitch down to but not including the muscles

When the perineum is closed to the level of the base of the penis, the inguinal incisions are next sutured The central skin flap is pulled well down so that the maximum advantage is gained in covering the base of the penis on its dorsal aspect.

The inner skin of the prepuce which remains attached to the penis is now retracted and carefully cleaned on the inside which is often necessary It is first sutured with one stitch in the middle line on the dorsal aspect to the skin at the base of the penis A stitch is then placed at each side equidistant from the centre The inferior position is then closed and the remaining intervals sutured neatly No drainage is required following this operation Dressings are applied and the patient returned to the ward and given a sedative

Reactionary hæmorrhage following the operation is very rare Retention of urine following the operation is exceptional in spite of the magnitude of the operation about the genital area One dose of long acting penicillin is advantageous



FIG 315



FIG 316

Fig 315—Same patient as in F g 309 four weeks after operation Testes transplanted to thighs
Fig 316—Pat ent showing skin graft of penis following elephantias s operation

in controlling minor skin sepsis which is difficult to avoid because of the necessity of handling the scrotum during operation The scrotum with its corrugations even though well washed and disinfected is difficult to sterilise completely Fig 315 shows the early convalescent result achieved in the case of the patient depicted in Figs 309, 312, and 314 four weeks after operation No skin graft was necessary using the technique recorded In patients who have been circumcised and later develop elephantiasis of the scrotum and penis, it is usually necessary to skin graft the shaft of the penis as shown in Fig 316

It is not easy to trace patients in the tropics after many years, but it is of interest relative to elephantiasis of the scrotum to note that following this operation patients remain fertile Transplantation of the testicles into the thighs provides conditions not unlike those provided in the scrotum One patient seen in North West Ghana five years after this operation was performed had two of his own children with him who had been born since the operation was performed

No cases of elephantiasis of the vulva have been personally encountered, but several cases have been seen where a large unilateral pendulous mass was present

excised has exceeded in weight that of the patient following operation

Filarial elephantiasis is rare under the age of 20 years It is greatly aggravated by the super-addition of septic conditions about the legs or genital areas Filarial elephantiasis of the arm is seen occasionally, but is rare No cases have been personally operated upon The ease with which the arm can be elevated during rest, greatly encouraging drainage, makes operation less urgent Quintin Stewart [12] reported an unusual case of elephantiasis of the face which is exceptionally rare Pendulous glands of the groin are not very unusual Elephantoid conditions of the breast are seen occasionally (Fig 252) In most cases they are unilateral and there is a history of a chronic low grade septic condition having been present in most cases The condition is best treated by amputation of the breast

DRACONTIASIS

Guinea-worm infection, also termed dracontiasis, is as the name implies a *type of subcutaneous worm infection commonly found in the Guinea Coast area* of Africa The condition although seen most commonly in tropical Africa is also found in the Middle East and India It occurs to a lesser extent in Central and tropical South America This infection is classed with the filarial diseases as it has many characters in common with them The adult female worm is white in colour, it measures from 1 to 3 ft in length The male worm is 2 to 3 cm long and is seldom seen As with the other filarial diseases guinea worm infects man through an intermediate vector, the water-flea Cyclops in this case The infection is characteristically associated with poor water supplies It is common in areas of the tropics where shallow wells are used or surface water only is available for drinking and domestic purposes The condition is being eradicated gradually by the introduction of chlorinated piped water supplies to towns and villages from reservoirs which can be properly controlled and the water chlorinated in a systematic manner Reindorf [13] reports that in 1900, before the introduction of pipe-borne water in Accra, Gold Coast, guinea-worm infection could be found in almost every household With the closure of wells and the use of tap water this condition disappeared rapidly from the locality Hoffman [14] has noted a conspicuous fall in the incidence of guinea-worm disease in the Wa area of North-West Ghana since the introduction of piped water in 1956 Onabamiro [15] records that in some parts of South-West Nigeria in 1952 as many as 50 to 60 per cent of the school children were affected with guinea worm On making a survey of pool water it was found that on an average each pint of water examined contained one guinea-worm larva Waddy [16] found that the addition of D D T in very small quantities to shallow water supplies caused a dramatic fall in the incidence of guinea-worm infections in hyperendemic districts The amount used was ten parts per million added to the water In this very dilute solution it is not dangerous to persons using the water This simple and safe measure could easily be carried out by any sanitary inspector Much alarm was caused in a large up-country

e in West Africa in 1943, where a chlorinated piped water supply was used, many guinea-worm larvæ were found in the water drawn from the taps mediate investigations showed that one of the filter beds at the local water works defective and also chlorine was not being added to the water The faults were ified immediately The larvæ could be seen quite easily in the water drawn m the taps They were about 1 mm long and white in colour Several larvæ peared in each glass of water as seen by myself, the infection was very heavy uinea-worm infection does not give rise to conspicuous disease till the adult male worm matures and appears beneath the surface of the skin as a sinuous nflamed area before penetrating the surface for the purpose of ovulating There s marked redness of the surface easily seen in a light coloured skin though this is ess conspicuous in a dark complexion A blister soon develops in most cases about the ankle or dorsum of the foot The head of the worm protrudes and as

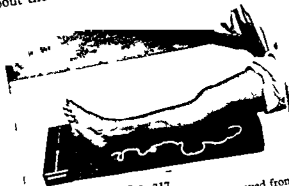


Fig 317



Fig 318

Fig 317—Complete guinea worm removed from a patient Dr P Knutsen s case

Fig 318—Guinea worm being wound out from the right ankle position on a match stick

the blister ruptures, which is usually caused by scratching at an early stage, the embryos are released If the embryos reach the local domestic water supplies where Cyclops fleas are present the infection is perpetuated as the embryos enter the intermediate host In due course the larvæ are extruded from the water-flea and swim freely in water The water being drunk by persons causes new infection Male and female larvæ burrow in the tissues in the same manner as filaria worm of other types and mature during the following twelve months After matur is reached the impregnated female worm becomes apparent under the skin of t patient affected At this stage urticarial reaction may occur and the patient devel an eosinophilia There is fever malaise and dizziness on occasions and in so instances vomiting Secondary infection in the tissues gives rise to cellulitis severe type in many cases It is extremely painful, there is marked swellin the parts involved and the patient is acutely ill Bathing the area with w where the worm is noted encourages it to come to the surface It is very ur to attempt removal of a guinea worm by dissection Such a procedure is a invariably followed by gross sepsis A long wound is necessary to remov worm and healing is very slow and often followed by keloid formation—s

should therefore be avoided The old-fashioned method of removal by tying the point of the worm on to a match stick with a thread and winding it up gradually as it emerges still remains the method which is difficult to improve upon Care must be exercised to avoid undue traction otherwise the worm will break and this causes serious complications aggravating the cellulitis and producing urticarial reactions Worms can frequently be removed without undue difficulty if they appear in the soft tissues of the penis or the scrotum Fig 105 shows a guinea worm being removed from the scrotum The guinea worm depicted in Fig 317 was removed by Dr Knudsen from the scrotum of a convict prisoner, a gentle traction being applied for only fifteen minutes and the complete worm was extracted without being damaged The worm was placed on a dark cloth and photographed beside a leg to illustrate its size and sinuous appearance It measured



FIG 319



FIG 320

Fig 319—Guinea worm cyst shown at the position of the inferior angle of right scapula

Fig 320—Guinea worm cyst placed at position of posterior part of crest of ilium

32 in Fig 318 shows a guinea worm being removed from the lateral aspect of the foot It may take up to three weeks to remove the worm particularly if it is placed in a position adjacent to tendons The time consumed is a disadvantage and, in view of this, several methods have been adopted with a view to killing the worm in the tissues as soon as it becomes apparent and before infection develops An oily solution of ½ gm of phenothiazine is injected at two sites into the worm Perchloride of mercury 1 in 1,000 solution ½ c c can also be injected at three different positions Hoyte [17] has used an injection of ½ c c of acetylarsan into the worm in three positions for this purpose with considerable success If the worm can be killed without inducing complications it is an advantage The worm, in the absence of secondary infections, is absorbed slowly following injection treatment In many instances it is slowly calcified as seen in Figs 101 and 222 Many calcified guinea worms are detected quite incidentally when patients are X-rayed for fractures Secondary infection associated with guinea-worm disease can in most cases be controlled by sulpha drugs and antibiotics, rest and elevation of the affected part, all of which are beneficial In some instances a large abscess develops and serious secondary hæmorrhage may occur from the deep-seated veins

Guinea worms frequently become impacted in the tissues This occurs in most instances at areas where muscles have fibro-aponeurotic attachments adjacent to bony structures A large cystic mass develops in many instances Most of these " cysts " are found about the trunk The inferior angle of the scapula is a particularly characteristic position (Fig 319) A cyst in a similar position is shown in Fig 221 The term " chronic guinea-worm abscess " is sometimes used but is less suitable A guinea-worm cyst may occur at any position One has been noted in the labium major of a female patient Intra-abdominal guinea-worm cysts (Fig 22) may be a cause of error in diagnosis of abdominal conditions One female patient was seen with a very large guinea-worm cyst of the abdominal cavity which ruptured into the urinary bladder, she was seriously ill for several months



FIG 321
Small guinea worm cyst dissected out showing loops of the worm protruding

with the condition The crest of the ilium at its posterior aspect is a position where guinea-worm cysts are frequently found as seen in Fig 320 This type of swelling may be precipitated by carrying loads on the back The term " Kikuyu bursa " has been used by Harris and Angawa [18] to describe a condition very similar to the one depicted In Kikuyu country, Kenya, it is usual for women to carry heavy loads suspended from a strap which goes over the forehead and across the back of the shoulders to hold the load which rests at the level of the crest of the ilium The irritation caused by pressure over the bony edge of the pelvis is probably the precipitating factor in the localisation of guinea-worm cysts in this position These cysts are very frequently mistaken for lipomata They have a soft rubbery consistency but, because they are deeply seated, it is not easy to detect fluctuation in spite of them containing pus A lipoma is almost invariably placed superficially to the muscle layers, but if a careful examination is carried out in the case of guinea-worm cysts, it will be found in almost all cases that the cyst is covered completely or in part by a thin stretched layer of muscle over its surface The patient should be asked to tighten the muscles about the area of the swelling and frequently it will be found that part of the swelling is deep to the muscle and this

is very characteristic On looking carefully at the surface of a guinea-worm cyst, it can be seen in most of the cases that there is a minute scar-like appearance on the surface of the swelling which is often not much larger than the head of a straight pin, but is easily noted as in Fig 320 This is very characteristic of guinea-worm cysts and is never seen over lipomata If the clinical similarity between guinea-worm cyst and lipomata is not appreciated an attempt may be made to dissect out what is thought to be a lipoma, but it is soon noted that great difficulty is experienced in finding a plane of cleavage between the normal subcutaneous fat and the tumour The tissues beneath the skin in guinea-worm cysts are very fibrotic and on proceeding deeper the cyst is unexpectedly entered and pus escapes The nature of the condition then becomes obvious The pus is in almost all cases sterile Fig 321 shows a small guinea-worm cyst dissected out which on opening showed loops of guinea-worm coming from it If doubt exists as to the nature of a smooth cystic like swelling in areas of the tropics where dracontiasis is encountered, the mass should be punctured with a wide bore exploring needle (S W G 14) If the mass is a lipoma nothing can be aspirated, but if it is a guinea-worm cyst pus is withdrawn In some instances the worm is aspirated into the syringe and on removing the syringe the worm is seen hanging from the needle Fig 254 shows a patient with a large guinea-worm cyst simulating a case of gynæcomastia On careful examination in this case it was apparent that the pectoralis major muscle was superficial to the swelling in its medial aspect Guinea-worm infection sometimes complicates surgical conditions affecting the scrotum, herniæ and hydrocele Fig 94 shows a patient with funiculitis due to this condition There is much thickening of the cord area and the head of the guinea worm is seen protruding from the skin close to the inguinal area

As tropical diseases are brought under control and are eradicated many [illegible]

in the literature Careful observations being made at present may well give the answer to the problems of the future

REFERENCES

1 Burch T A Qualls, D M & Greenville H J (1955) Onchocerciasis in Liberia *Amer J trop Med Hyg* 4 923

2 Van den Berghe L & Chardome M (1951) Easier diagnosis of malaria and filariasis *Amer J trop Med Hyg* 31 411

3 [illegible] *Hyg* 58, 173

4 [illegible] *J trop Med Hyg* 57 8

5 [illegible] ies in filariasis in East Africa [illegible] 53, 41

6 Burch, T A & Greenville, H J (1955) Filariasis in Liberia *Amer J trop Med Hyg* 4, 47

7 Moons, H (1957) Note à propos au traitment de larva migrans *Ann Soc belge Méd trop* 37, 559

8 Jordan, P (1959) A pilot scheme to eradicate bancroftian filariasis with dicarbamazine *Trans roy Soc trop Med Hyg* 53 54

9 CONRAN, O F & WADDY, B B (1956) The effect of Antrypol treatment on blindness due to onchocerciasis *J trop Med Hyg* 59 52
10 BOWESMAN, C (1938-39) Intra arterial glycerin treatment of elephantiasis *Brit J Surg* 26, 86
11 MEHTA, V P (1950) Treatment of lymphœdema and elephantiasis *Indian J Surg* 12, 89
12 STEWART, Q (1934) Elephantiasis of the face *W Afr med J* 8, No 1, 9
13 REINDORF, C E (1954) The influence of fifty years of scientific medicine on belief and customs in the Gold Coast *W Afr med J* 3, 115
14 HOFFMAN, C S (1957) Guinea worm in the Wa area of Ghana Personal communication
15 ONABAMIRO, S D (1952) The geographical distribution and clinical features of *Dracunculus medinensis* in South West Nigeria *W Afr med J* 1, 159
16 WADDY, B B (1956) Organisation and work of the Gold Coast medical field units *Trans roy Soc trop Med Hyg* 50, 313
17 HOYTE, R A S (1957) Injection of guinea worm with acetylarsan Personal communication Ghana
18 HARRIS, B P & ANGAWA, J O W (1952) Rupture of the uterus Illustration *E Afr med J* 29, 81

INDEX

Index

C

G

H

I

O

P

Q

R

S